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Regulating Eating through Acceptance and Commitment Therapy (RE-ACT): A single case experimental design to evaluate a guided self-help intervention for individuals who are overweight or obese and engage in emotional eating

Short title: Regulating Eating through Acceptance and Commitment Therapy (RE-ACT): A guided self-help approach

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Thesis Abstract

Background: Obesity rates are growing globally along with the associated health and economic consequences (Caballero, 2007). However, weight loss is difficult, highlighting the need to address the psychological challenges of obesity (Wing & Phelan, 2005). Obesity is linked with emotional eating (Torres & Nowson, 2007). Therefore, interventions which may tackle emotional eating may address obesity. This study evaluated the effectiveness of an Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999) intervention which has been considered helpful for this clinical problem.

Method: Six participants engaged in a five week guided self-help ACT intervention. Utilising an AB single case experimental design (SCED) and follow-up, participants completed a range of implicit, explicit and behavioural assessments; targeting areas such as emotional eating, psychological ACT processes (referred to hereafter as ACT processes), Body Mass Index (BMI), and daily recordings of calorie intake and mood. Reliable and clinically significant changes were calculated on self-report measures. Simulation Modelling Analysis (SMA) examined the relationship between mood and calorie intake across baseline and intervention phases.

Results: Half of the sample no longer met the criteria for “emotional eating” at follow-up. On the self-report measures, all participants “recovered”¹ on at least one ACT-specific process, whilst two participants “recovered” from emotional eating. There was some evidence of temporal precedence whereby changes in the ACT processes occurred, prior to, or alongside, changes in emotional eating. SMA revealed a decrease in emotional eating in the intervention phase compared to the baseline phase for some participants. Inconsistencies were found between the implicit and explicit measures of emotional eating. Post-intervention, four participants lost weight, three of whom maintained the weight loss at follow-up. All participants reported benefits from ACT.

Discussion: Given the current obesity epidemic and the associated adverse consequences, finding an effective intervention for weight management is critical. This study resulted in four important findings; (a) ACT proved promising for some participants in reducing emotional eating and shifted the ACT process

¹ Achieved both reliable and clinically significant change (Davies & Sheldon, 2011).

variables in a positive direction; (b) There was some evidence that ACT processes mediated changes in emotional eating. This has important theoretical implications as it indicates that mindfulness, defusion, values and acceptance influence emotional eating. Although theories have hypothesised this to be the case, this study provides empirical support. However, more single case research is required to demonstrate the replication of effect prior to refining weight management interventions; (c) Improvements in emotional eating measures did not reduce weight in all cases. This suggests that ACT alone, or in its current modality, may not be sufficient for behavioural change. It is suggested that more intensive input may be needed, or that ACT may make a useful adjunct to standard behavioural interventions. Nevertheless, in terms of cost-effectiveness, the brevity and modality of this intervention is a promising start, and (d) There were mixed findings regarding the impact of the intervention on the implicit emotional eating measure; correspondence with the explicit measure occurred for some participants. The utility of implicit measurement in targeting attitudes, behaviour or initial responses in this sample is questionable.

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Finally, heartfelt and genuine thanks to all the participants who took part in this study, without whom this would not have been possible.

Statement of Contribution

| <i>Systematic review</i> | |
|--|--|
| Design, search, reviewed search results, summary of data and write-up. | Mary Jinks (supervised by Dr Nima Golijani-Moghaddam, Dr David Dawson, and Dr Mike Rennoldson). Dr Nima Golijani-Moghaddam provided advice regarding the calculation of effect sizes, and later supported an inter-rater reliability check. |
| <i>Thesis</i> | |
| Project Design | Mary Jinks (supervised by Dr Nima Golijani-Moghaddam, Dr David Dawson, and Dr Mike Rennoldson). Due to the overlap in design with projects by two Trainee Clinical Psychologists, Joe Priestley and Lauren Roche, there were some shared supervision meetings. In one particular meeting, we collaboratively developed the daily ACT measure assessing psychological flexibility. However, efforts were made to make this project distinct, for example, I created a new procedure diagram (see Figure 1). I also developed the results table (see Table 6) in supervision with Dr Nima Golijani-Moghaddam and granted permission for the other two trainees to use this should they wish. |
| Application for Ethical Approval | Mary Jinks (supervised by Dr Nima Golijani-Moghaddam, Dr David Dawson, and Dr Mike Rennoldson) |
| Participant Recruitment | Mary Jinks |
| Data Collection | Mary Jinks Joe Priestley conducted the participant change interviews. Joe Priestley and Lauren Roche checked treatment fidelity on a sub-sample of the recorded weekly check-in telephone support. |
| Data Analysis and write-up | Mary Jinks (supervised by Dr Nima Golijani-Moghaddam, Dr David Dawson, and Dr Mike Rennoldson). |

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Systematic review

Acceptance and Commitment Therapy-informed approaches to weight management:
A systematic review of Randomised Control Trials

RUNNING HEAD: ACT APPROACHES TO WEIGHT MANAGEMENT

Abstract

Objective: To systematically review literature examining the effectiveness of Acceptance and Commitment Therapy (ACT) and ACT-informed approaches for weight management, in terms of their impact on physical or psychological outcomes.

Method: Three electronic databases (PsycINFO, MEDLINE and EMBASE) were searched employing a search strategy comprised of relevant terms for 'ACT', 'weight management' and 'eating behaviours'. Reference lists were trawled and citing articles were identified via Google Scholar. In addition, experts in the ACT community were consulted for knowledge of additional papers. Inclusion criteria were that the study compared a control condition with an ACT or ACT-informed intervention, and measured physical or psychological outcomes. Grey literature was excluded. A total of 14 papers (based on 10 samples) were included.

Results: Notwithstanding heterogeneity in treatment target and delivery, identified ACT interventions drew on common theoretical processes: facilitating synthesis of evidence and descriptive comparisons of effect sizes. Control conditions varied, but contrasts generally yielded effects in a direction favouring ACT, with small to moderate effect-sizes.

Discussion: Overall, available evidence supported the superiority of ACT or ACT-informed interventions in comparison with controls. However, the methodological limitations of reviewed studies precluded firm conclusions.

Keywords: Acceptance and Commitment Therapy, weight, eating behaviour, physical activity, systematic review.

Acceptance and Commitment Therapy-informed approaches to weight management: A systematic review of Randomised Control Trials

This paper reports a systematic review of the effectiveness of Acceptance and Commitment Therapy (ACT), for resolving clinical problems concerned with eating behaviour and weight. This broad group of clinical problems share a primary psychological or behavioural component, and we use the umbrella term 'weight management'² to refer to them in this review. Within the remit of weight management, consideration is given to food, body weight, eating behaviours and calorie control (Wilfley, Kolko & Kass, 2011)³. Psychological factors (e.g. maladaptive coping) may drive weight-related issues, making them challenging to treat. This broad focus is theoretically consistent with ACT itself, as a psychological therapy targeting higher psychopathological processes shared across many clinical problems with a psychological or behavioural component.

Weight management includes problems such as diagnosed eating disorders including anorexia nervosa, bulimia nervosa, binge eating disorder and eating disorder not otherwise specified (Diagnostic and Statistical Manual of Mental Disorders, fifth edition; DSM-5; American Psychiatric Association, 2013). Weight differs across these groups. For example, individuals with anorexia are underweight, whereas weight may vary between normal and overweight ranges in individuals with bulimia and binge eating disorders (Wilfley et al., 2011). Obesity is at the other end of the weight spectrum and although it is not classified as an eating disorder, it is considered a global problem (Moreno & Tandon, 2011). There is also evidence to suggest that binge eating may be associated with obesity (Hasler et al., 2004). The recent obesity epidemic is a great cause for concern (World Health Organization, 2000). While not without limitations, Body Mass Index (BMI) is the standard method

² The term weight management will be used in this review to consider different sub-groups within the population of interest; namely, those who suffer from eating disorders or obesity. A rationale for the grouping of obesity and eating disorders is because they both serve the function of reducing or increasing eating behaviour. This grouping and epistemological stance sits with the ACT model and underpinning functional contextualist philosophy.

³ The scope of this review considers behaviours associated with weight management, such as eating, diagnosed eating disorders or broader lifestyle change (for example, weight loss, weight gain, and physical activity).

of classifying healthy weight and is calculated by considering weight in relation to height (Wardle, 2009).

The consequences of weight management issues are far-reaching, encompassing psychological and physical health complications, decreased life expectancies and financial implications for the health system (Reilly & Kelly, 2010; Wyatt, Winters & Dubbert, 2006; Tapper et al., 2009). Eating disorder populations are typically dissatisfied with their body shape and size and usually resort to using extreme methods such as restrictive or excessive food intake or other compensatory strategies. This results in problems with self-esteem, stigmatization (Goldschmidt et al., 2010; American Psychiatric Association, 2006) and numerous physical health consequences including osteoporosis, kidney failure and dysregulated body temperature (Pomeroy & Mitchell, 2002; Goldstein, Herzog, Misra & Sagar, 2008; Tanofsky-Kraff et al., 2007). These issues increase the probability of premature death (Birmingham, Su, Hlynsky, Goldner & Gao, 2005). Although correlation does not infer causation, there are also high rates of co-morbidity with depression and anxiety (Beumont, 2002; Bulik, 2002). Conversely, obesity has also been shown to be linked with low self-esteem, depression and stigmatization (Goldschmidt et al., 2010; BeLue, Francis & Colaco, 2009; Hayden-Wade et al., 2005). In terms of physical health implications, being overweight or obese may increase the risk of heart disease, diabetes and cancer (August et al., 2008).

It is important that eating and weight-related behaviour is understood and management is improved to prevent the associated negative health consequences. An increase in our understanding of how behaviour can be modified would enable individuals to take control of eating and activity, motivate those who struggle to make the necessary changes, and improve quality of life.

Psychological factors implicated in weight management include cognitive biases, learning experiences, compensatory strategies and behavioural patterns. For example, skewed beliefs about the self, resulting from an over-evaluation of weight and shape (Fairburn, Cooper & Shafran, 2003) or experiences of being bullied which may lead to interpersonal difficulties and may result in food being used as a maladaptive coping strategy (Taylor et al., 2006; Warschburger, 2005; Luppino et al., 2010). These developmental risk factors have an influential role in maintaining behaviour, and thus suggest the importance of psychological intervention for addressing these factors.

A psychological model which has gathered particularly strong empirical support for intervening with psychological factors involved in eating behaviours and weight control is Cognitive Behavioural Therapy (CBT). CBT hypothesises how cognitive appraisal acts as a mediator of change, impacting on an individual's feelings and behaviours (Beck, Rush, Shaw & Emery, 1979). Therefore, CBT provides a psychological understanding of eating behaviours as well as a means for addressing such behaviours by targeting thoughts. CBT strives to reduce or challenge maladaptive thoughts and feelings. However, controlling and challenging thoughts has proven ineffective with some individuals and even iatrogenic in certain cases (Marcks & Woods, 2005). In view of the empirical findings for CBT (for example, poor outcomes in some instances), it is necessary and valuable to evaluate alternative theoretical perspectives.

ACT is a relatively new therapy in its application to weight management. ACT has emerged as a promising approach in terms of its theoretical appropriateness, clinical developments, and early empirical reports (Hayes, Luoma, Bond, Masuda & Lillis, 2006; Guadiano & Herbert, 2006; Zettle & Hayes, 1986). Studies have shown that ACT-based approaches can enable behavioural change and improve health outcomes (Powers, Zum Vorde Sive Vording & Emmelkamp, 2009). For instance, recent studies have showed improvements in coping with food cravings, helping disordered eating attitudes, increasing physical activity, reducing emotional eating and helping weight loss maintenance (Forman, Herbert, Moitra, Yeomans & Geller, 2007; Pearson, Follette & Hayes, 2012; Butryn, Forman, Hoffman, Shaw & Juarascio, 2011; Kristeller & Hallett, 1999; Lillis, Hayes, Bunting & Masuda, 2009).

ACT aims to target experiential avoidance, which is an unwillingness to experience negative thoughts, emotions and physical sensations. By doing so, ACT aims to increase psychological flexibility which involves strengthening an individual's ability to select and commit to behaviours regardless of the internal distress experienced (such as emotions, fatigue or food cravings). A novel feature of ACT is acceptance, in that it encourages endurance of difficult thoughts and feelings in respect to reaching goals, so as to stimulate behavioural change and live a fulfilled life (Nes, Eide, Kristjansdottir & van Dulmen, 2013). This may be applied to physical activity as well as eating behaviours. For example, emotional over-eaters may be encouraged to increase their psychological flexibility by considering their long-term values, such as living a longer life so that they can spend time with family. In this

respect, they may be encouraged to choose behaviours (for example, a balanced diet and exercise) which are congruent with these values as opposed to responding to immediate contingencies (for example, eating high calorific food which temporarily makes them feel good). ACT has been considered useful in helping an individual achieve their long-term goals (Lillis & Kendra, 2014).

ACT might be particularly useful for this population because it transcends specific and higher order pathological processes across all areas of eating behaviour and suffering. From an ACT perspective, despite differences in presentation, clinical problems of weight loss and weight gain both reflect some degree of psychological inflexibility (i.e., a constricted pattern of behaving) and would be expected to be similarly amenable to ACT-based intervention (Skinner, 1984; Törneke, Luciano & Valdivia, 2008). This inclusive approach mirrors strong arguments in the psychological literature that eating disorders are maintained by similar psychopathological processes. For example, the Transdiagnostic Model (Fairburn, Cooper, & Shafran, 2003) proposes a commonality on the mechanisms involved in the maintenance of bulimia, anorexia and atypical eating disorders. It is also acknowledged that disordered eating can be a response to mood intolerance (Wildes, & Marcus, 2011), which ACT seeks to address (Hayes, Strosahl & Wilson, 1999). Whilst organised around a strong theoretical core concerning acceptance and psychological flexibility, ACT is a deliberately heterodox school of therapy and promotes no single manual of practice. We therefore included ACT-informed interventions to better reflect this approach.

Despite these early promising findings, the effectiveness of ACT for weight management issues remains unknown as there are no reviews of treatment outcome studies in this area. Only one previous literature review exists (Manlick, Cochran & Koon, 2013), which examined the effectiveness of ACT for eating disorders. The authors found evidence to support ACT in tackling emotional avoidance and considered it as an effective method for treating eating disorders. However, this was not a systematic review and it did not address the broader weight management concerns also included in the review reported here.

Therefore it seems timely to review the effectiveness of ACT-based interventions in the area of weight management. Moreover, this is particularly important because we are in the midst of an obesity epidemic which has psychological and financial implications (World Health Organization, 2000). There is a need to know what works

so that interventions can be targeted accordingly. This is the first systematic literature review to investigate ACT-informed approaches to weight management. To achieve this aim, we examined studies of ACT or ACT-informed interventions on outcomes of eating behaviour, physical activity, and weight. This review focused on Randomised Controlled Trials (RCTs) because they are considered the highest standard of evidence (Ferriter, 2011).

2. Method

2.1 Inclusion and exclusion criteria

2.1.1 Inclusion criteria

The criteria for inclusion were developed by drawing on a PICO template (Richardson, Wilson, Nishikawa & Hayward, 1995). *Population*: All participants must have difficulties with weight management although these do not need to be diagnosed. Participant demographics (age, gender or diagnoses) were included, providing the other specified criteria were met. *Intervention*: Studies which described ACT or an ACT-informed intervention in detail as the main intervention for weight management i.e. the intervention included ACT processes (acceptance, cognitive fusion, being present, self as context, values, committed action) and targeted weight (loss/control/gain), physical activity or eating behaviours. *Comparison*: Studies must report using a Randomised Control Trial including either a passive or active control group. *Outcome*: Only studies containing quantitative data for example either physical (e.g. BMI, exercise) or psychological outcome measures (e.g. eating disordered attitudes) relating to weight management. In addition, studies which contained qualitative data were still included in the review but only the quantitative aspects were extracted. Furthermore, only peer-reviewed journal articles (for quality control reasons) and articles written in English (as the translation of texts was not feasible within the scope of this review) were included.

2.1.2 Exclusion criteria:

A series of a priori exclusion criteria were also defined. Studies were excluded in the review if they were:

- Studies whereby the intervention involved an ACT or ACT-informed strategy or technique which was unclearly described; for example, one paper (Hooper, Sandoz, Ashton, Clarke & McHugh, 2012) was excluded because it was based on an ACT technique and the strategy itself was not defined adequately (e.g. little description of ACT processes involved).
- Any interventions that do not include ACT-based principles for weight management.
- Case studies or descriptive quantitative studies, which do not have a control (because of their limited generalisability).

- Grey literature, for example unpublished papers or dissertation articles; book chapters and policy papers (for pragmatic and quality control reasons).

2.2 Searching

A PRISMA diagram of the article identification process is outlined in Figure 1. Initially the Cochrane Database of Abstracts of Reviews of Effects (DARE) was checked to ensure a similar review had not been conducted recently. Relevant articles were identified via literature searches conducted in the following online databases (with period noted): PsycINFO (1806- Week 1, October 2014), Medline (1969 – Week 1, October 2014) and EMBASE (1980 –Week 1, October 2014). Search strategies were adapted for each database (see appendix 1 for the search terms for PsycINFO). Both medical subject headings (MeSH) and text words were utilised to aid searching. Terms related to Acceptance and Commitment Therapy were entered in conjunction with terms related to weight or eating behaviours or food using Boolean operators (AND/OR) to allow a total search number for each database (e.g. “acceptance” AND “eating” AND “food”).

Several search terms were used to capture all relevant papers. For example, terms for eating behaviour included ‘eating attitudes’ and ‘eating’ and ‘eating habits’. The acronym ‘ACT’ was not included as a search term because it broadened the search unnecessarily in that it did not identify relevant articles. Regarding Acceptance and Commitment Therapy, adjacency searching was used to find words relating to this search term, doing so enabled a broader search than using the phrase search alone. Search terms were ‘exploded’ to retrieve articles which considered the same concept using different terminology.

Initial searches of the three databases produced 272 studies potentially relevant for the review. Of these, 57 were duplicates and were removed. The inclusion and exclusion criteria were applied whilst performing a title and abstract scan on the remaining 215 papers. This resulted in the removal of 187 articles because they violated the inclusion criteria (e.g. did not include an ACT or ACT-based intervention and weight related outcomes, or because they were dissertations, conference papers, reviews or book chapters) leaving 28 potentially relevant articles which were accessed in full copy. Furthermore, as electronic searching is not sufficient to identify all articles (Hopewell, Clarke, Lefebvre & Scherer, 2007).

Reference sections of all articles included in the review were checked to identify additional studies. Hand searching (.e.g. the bibliographies of the selected papers or reviews in a similar area were checked via the 'cited by' function on Google scholar) and consultation of expert authors and clinicians in the field of ACT via the Association of Contextual Behavioural Science (ACBS) website, led to the identification of 16 potential papers. A total of 44 papers were considered eligible for the review. After strict censor, a further 30 studies were removed. Fourteen eligible articles (based on ten samples⁴) fulfilled the criteria and were included in the review.

⁴ The rationale for including these studies was because they analysed the data with different aims and outcomes measures.

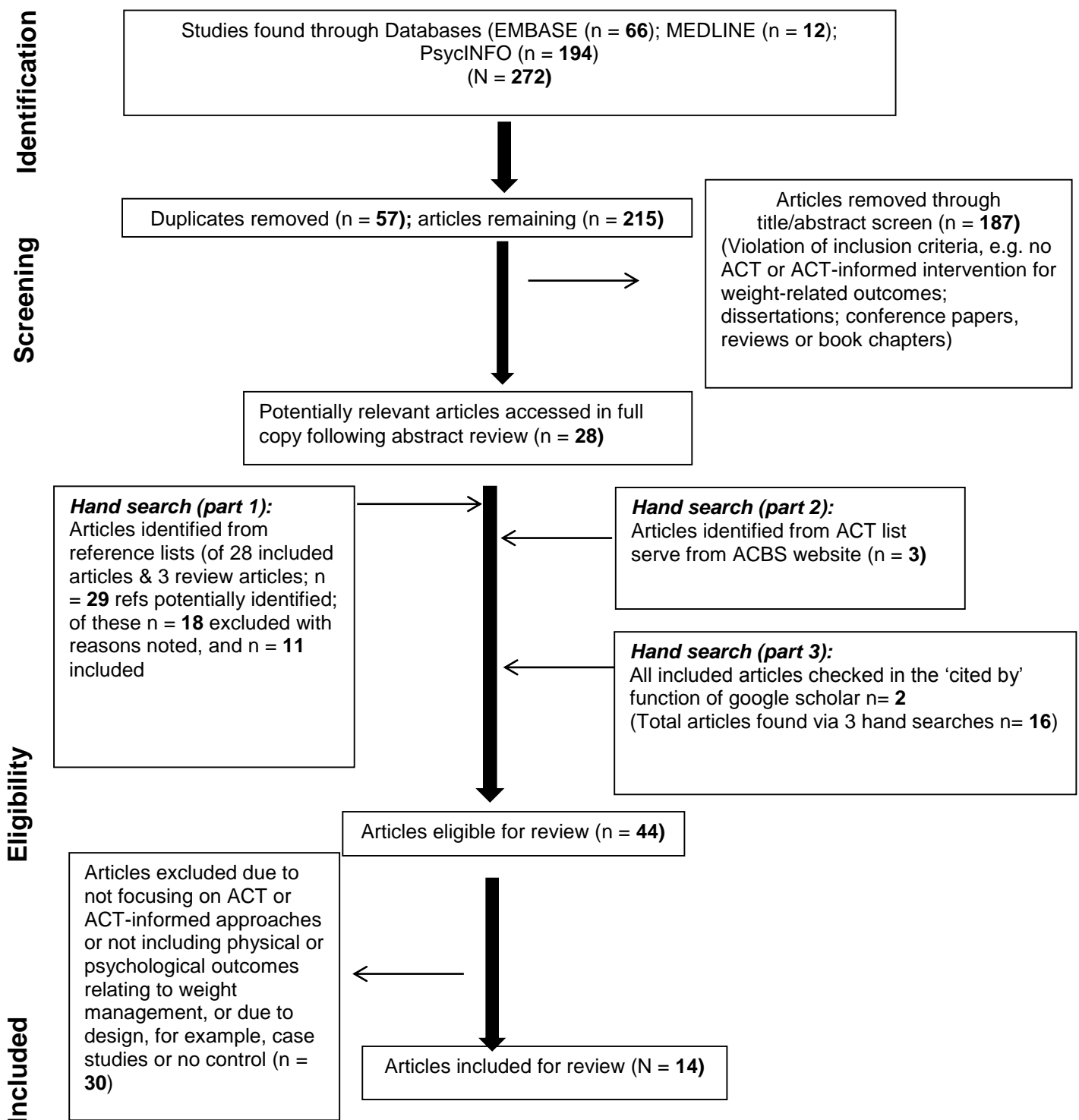


Figure 1. A PRISMA diagram for article screening and inclusion

2.3 Screening and data extraction

Study eligibility was discussed amongst co-authors. The eligibility criteria were applied and the decision to include or exclude articles on the basis of title and abstract sift and then on full-text articles was made. Queries were resolved through reaching a consensus. Each of the studies was evaluated using a data collection pro forma to obtain the following data from each article: authors, year of publication, location, sample size (total, ACT and control condition), population (gender, ethnicity, age, setting and participant), design, description of intervention, outcome measures and key findings. Where feasible, effect sizes (r values) were calculated for differences in physical and psychological outcomes between study groups by selecting the appropriate statistics from the article. Effect-size calculation was checked by the second author (NM).

2.4 Quality assessment tool

Although a number of quality rating tools exist in health research, many of them have not been developed via a meticulous process and so are not used widely within systematic reviews (Sanderson, Tatt, & Higgins, 2007). Rating tools that do exist have been criticised for not being tailored to assess bias in systematic reviews (Juni, Witschi, Bloch & Egger, 1999). Therefore, considering that there is no accepted 'top' tool to assess the susceptibility to bias (Katrak, Bialocerkowski, Massy-Westropp, Kumar & Grimmer, 2004), a quality assessment tool was developed for this systematic review, informed by the Psychotherapy Outcome Study Methodology Rating Form (POMRF; Öst, 2008). This tool is suitable for evaluating RCT's and consists of 22 items. It has good internal consistency ($\alpha = 0.86$) and good inter-rater reliability (Öst, 2008). For the purposes of this systematic review three items were deleted from the original tool because they were not considered fit for purpose (e.g. removal of one item relating to the severity/chronicity of the disorder because it pertains to diagnosis-led interventions, whereas this review has a broader transdiagnostic focus). Therefore, the POMRF was used with three less items to rate each paper. The POMRF criteria covers items relating to sample description, measures used, attrition, reporting and treatment delivery (relating to therapist competence, experience, treatment fidelity). Each criterion has a detailed description and for each item, a decision was made as to whether it was considered as poor (0),

fair (1) or good (2). If the information was not available (the authors did not specify) then this recorded as not available (X).

Novel criteria specifically relating to addressing the research question in this review were included and justification for doing so reported in the table (e.g. number of ACT processes described or used to enable comparisons to be drawn between studies and inform the quality assessment). Given that the precision and reliability of weighting individual components is unclear, a numerical scoring system for assessing bias was not employed. However instead a subjective summary was made based on the modal rating for each study. A copy of quality assessment criteria is listed in Table 1 below.

Table 1. *Assessment criteria of bias (Öst, 2008)**

| Area of bias | Description of categories |
|--|---|
| 1. Clarity of sample description | <p>(0) Poor = Vague description</p> <p>(1) Fair = Fair description (e.g. inclusion/exclusion criteria, demographics mentioned)</p> <p>(2) Good = Good description (e.g. inclusion/exclusion criteria, demographics and prevalence of comorbid disorders mentioned)</p> |
| 2. Representativeness of the sample | <p>(0) Poor = Sample is very different from patients seeking treatment for the disorder (e.g. there are excessively strict exclusion criteria.</p> <p>(1) Fair = Sample is somewhat representative of patients seeking treatment for the disorder.</p> <p>(2) Good = Sample is very representative of patients seeking treatment for the disorder.</p> |
| 3. Specificity of outcome measures | <p>(0) Poor = Very broad outcome measures, not specific to the disorder.</p> <p>(1) Fair = Moderately specific outcome measures.</p> <p>(2) Good = Specific outcome measures.</p> |
| 4. Reliability and validity of outcome measures | <p>(0) Poor = Measures have unknown psychometric properties, or properties that fail to meet current standards of acceptability.</p> <p>(1) Fair = Some, but not all measures have known or adequate psychometric properties.</p> <p>(2) Good = All measures have good psychometric properties. The outcome measures are the best available for the authors' purpose.</p> |

| | |
|-----------------------------------|---|
| | (X) N/A = Not available (information not reported). |
| 5. Use of blind evaluators | <p>(0) Poor = Blind assessor was not used (e.g. assessor was the therapist, assessor was not blind to the treatment condition, or the authors do not specify.</p> <p>(1) Fair = Blind assessor was used, but no checks were used to assess the blind.</p> <p>(2) Good = Blind assessor was used in correct fashion. Checks were used to assess whether the assessor was aware of treatment condition.</p> |
| 6. Assessor training | <p>(0) Poor = Assessor training and accuracy are not specified, or are unacceptable.</p> <p>(1) Fair = Minimum criterion for assessor training is specified (e.g. the assessor has had specific training in the use of the outcome measure), but accuracy is not monitored or reported.</p> <p>(2) Good = minimum criterion of assessor training is specified. Inter-rater reliability was checked, and/or assessment procedures were calibrated during the study to prevent evaluator drift.</p> |
| 7. Assignment to treatment | <p>(0) Poor = Biased assignment, e.g. patients selected their own therapy, or were assigned in another non-random fashion, or there is only one group.</p> <p>(1) Fair = Random or stratified assignment. There may be some systematic bias but not enough to pose a serious threat to internal validity. There may be therapist by treatment confounds. <i>N</i> may be too small to protect against bias.</p> |

| | |
|------------------------------|---|
| | <p>(2) Good = Random or stratified assignments, and patients are randomly assigned to therapist within condition. When theoretically different treatments are used, each treatment is provided by a large enough number of different therapists. <i>N</i> is large enough to protect against bias.</p> <p>(X) N/A = Not available (information not reported).</p> |
| 8. Design | <p>(0) Poor = Active treatment vs. WLC, or briefly described TAU.</p> <p>(1) Fair = Active treatment vs TAU with good description, or placebo condition.</p> <p>(2) Good = Active treatment vs. another previously empirically documented active treatment.</p> <p>(X) N/A = Not available (information not reported).</p> |
| 9. Power analysis | <p>(0) Poor = No power analysis was made prior to the initiation of the study.</p> <p>(1) Fair = A power analysis based on an estimated effect size was used.</p> <p>(2) Good = A data-informed power analysis was made and the sample size was decided accordingly.</p> <p>(X) N/A = Not available (information not reported).</p> |
| 10. Assessment points | <p>(0) Poor = Only pre- and post-treatment, or pre- and follow-up.</p> <p>(1) Fair = Pre-, post-, and follow-up < 1 year.</p> <p>(2) Good = Pre-, post-, and follow-up > 1 year.</p> <p>(X) N/A = Not available (information not reported).</p> |

| | |
|--|--|
| 11. Manualized, replicable, specific treatment programs | <p>(0) Poor = Description of treatment procedure is unclear, and treatment is not based on a publicly available, detailed treatment manual. Patients may be receiving multiple forms of treatment at once in an uncontrolled manner.</p> <p>(1) Fair = Treatment is not designed for the disorder, or description of the treatment is generally clear, and based on a publicly available, detailed treatment manual, but there are some ambiguities about the procedure. Patients may have received additional forms of treatment, but this is balanced between groups or otherwise controlled.</p> <p>(2) Good = Treatment is designed for the disorder. A detailed treatment manual is available, and/or treatment is explained in sufficient detail for replication. No ambiguities about the treatment procedure. Patients receive only the treatment in question.</p> <p>(X) N/A = Not available (information not mentioned).</p> |
| 12. Number of therapists | <p>(0) Poor = Only one therapist, i.e. complete confounding between therapy and therapist.</p> <p>(1) Fair = At least two therapists, but the effect of therapist on outcome is not analysed.</p> <p>(2) Good = Three, or more therapists, and the effect of therapist on outcome is analysed.</p> <p>(X) N/A = Not available (authors did not specify).</p> |
| 13. Therapist training/experience | <p>(0) Poor = Very limited clinical experience of the treatment and/or disorder (e.g. students).</p> <p>(1) Fair = Some clinical experience of the treatment and/or disorder.</p> <p>(2) Good = Long clinical experience of the treatment and the disorder (e.g. practicing therapists).</p> |

| | |
|--|---|
| | (X) N/A = Not available (authors did not specify therapist experience). |
| 14. Checks for treatment adherence | <p>(0) Poor = No checks were made to assure that the intervention was consistent with protocol.</p> <p>(1) Fair = Some checks were made (e.g. assessed a proportion of therapy tapes).</p> <p>(2) Good = Frequent checks were made (e.g. weekly supervision of each session using a detailed rating form).</p> <p>(X) N/A = Not available (the author did not specify if any checks were carried out).</p> |
| 15. Checks for therapist competence | <p>(0) Poor = No checks were made to assure that the intervention was delivered competently.</p> <p>(1) Fair = Some checks were made (e.g. assessed a proportion of therapy tapes).</p> <p>(2) Good = Frequent checks were made (e.g. weekly supervision of each session using a detailed rating form).</p> <p>(X) N/A = Not available (information not reported).</p> |
| 16. Control of concomitant treatments | <p>(0) Poor = No attempt to control for concomitant treatments, or no information about concomitant treatments provided. Patients may have been receiving other forms of treatment in addition to the study treatment.</p> <p>(1) Fair = Asked patients to keep medications stable and/or to discontinue other psychological therapies during the treatment.</p> <p>(2) Good = Ensured that patients did not received any other treatments (medical or psychological) during the study.</p> |

| | |
|---|---|
| 17. Handling of attrition | <p>(0) Poor = Proportions of attrition are not described, or described and no dropout analysis is performed.</p> <p>(1) Fair = Proportions of attrition are described, and drop-out analysis or intent-to-treat analysis is performed.</p> <p>(2) Good = No attrition, or proportions of attrition are described, dropout analysis is performed, and results are presented as intent-to-treat analysis.</p> |
| 18. Statistical analyses and presentation of results | <p>(0) Poor = Inadequate statistical methods are used and/or data are not fully presented.</p> <p>(1) Fair = Adequate statistical methods are used but data are not fully presented.</p> <p>(2) Good = Adequate statistical methods are used and data are presented with <i>M</i> and <i>SD</i>.</p> |
| 19. Equality of therapy hours (for non-WLC designs only) | <p>(0) Poor = Conditions differ markedly (> 20% difference in therapy hours).</p> <p>(1) Fair = Conditions differ somewhat (10-19% difference in therapy hours)</p> <p>(2) Good = Conditions do not differ (< 10% difference in therapy hours).</p> <p>(X) N/A = Not available (the information is not presented).</p> |
| 20. Intervention comparison (for non WLC designs only)** | <p>(0) Poor = Unclear or limited description provided</p> <p>(1) Fair = Clear description</p> <p>(2) Good = Good description and suitable for the problem area</p> <p>(X) N/A = Use this rating if design is WLC</p> |

| | |
|---|--|
| 21. Intervention classed as ACT or ACT-informed approach** | (1) Fair = Classified as an ACT-informed approach (2) Good = Classified as an ACT approach |
| 22. Number of ACT processes described/used** | (0) Poor = No ACT processes described, or only one or two used. (1) Fair = Three ACT processes described/used (2) Good = Four or more ACT processes described/used |
| 23. Clear behavioural outcomes included (e.g. weight)** | (0) Poor = None or unclear (1) Fair = Mentioned but uses self-reported ratings (2) Good = Yes, good rating method (.e.g. based on clear behavioural observations). (X) N/A = Study is focusing on psychological factors |
| Subjective summary (0) Modal number response; (0) Poor = generally unclear; (1) Fair = generally covered the points; (2) Good = good study which includes the most pertinent points. | |

* The following items from the original POMRF have been removed because they pertain to diagnosis-led interventions and were not considered suitable for the review which has a broader transdiagnostic focus: item two: severity/chronicity of the disorder; item four: reliability of the diagnosis in question; item 21: assessment is of clinical significance. **Novel criteria developed. Consultation with co-authors resulted in an agreement that the ACT processes would be divided as such. This is also in line with how the six ACT processes of the hexaflex map onto what is considered the four core processes (Hayes et al., 2004).

3. Results

3.1 Characteristics of identified studies

Fourteen studies with ten samples (n = 693) were included in this review, presented in Table 2. The majority of studies were conducted in the USA (N = 10 studies, based on seven samples). The remainder of studies were conducted in Sweden (N = two studies, based on one sample), Australia (N = 1) and the UK (N = 1). The number of participants across all studies ranged from 39 to 128. The majority of participants were females (n = 369). Mean ages ranged from 23.1 (3.8) to 50.6 (11). Studies focused on a mixture of outcomes and often overlapped. A range of variables including eating behaviour, activity and weight-related outcomes were measured. The specific number of studies for each of the outcomes were as follows: weight-related outcomes (n = five), eating behaviours (n = five) and physical activity (n = five). The duration of interventions varied in all studies from two to ten hours.

The majority of participants were recruited from community settings, with the exception of one study (Weineland, Arvidsson, Kakoulidis & Dahl, 2012) which recruited bariatric patients from a clinical centre for minimally invasive surgery. Other treatment settings included a university campus (Pearson, Follette & Hayes, 2012; Butryn, Forman, Hoffman, Shaw & Juarascio, 2011; Juarascio, Forman & Herbert, 2010; Katterman et al., 2014), general public (Forman et al., 2013); clients with type II diabetes who attended a low income community centre (Gregg, Callaghan, Hayes & Glenn-Lawson, 2007); community weight loss clinic (Lillis, Hayes, Bunting & Masuda, 2009); and general community (Tapper et al., 2009). Eating behaviours targeted by the ACT interventions included emotional eating (Tapper et al., 2009; Katterman, Goldstein, Butryn, Forman & Lowe, 2014; Forman et al., 2013); binge eating (Tapper et al., 2009; Juarascio, Forman & Herbert, 2010; Lillis, Hayes & Levin, 2011) and external eating (Tapper et al., 2009); and a range of measures were used for each.

Table 2: Characteristics of studies

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|---|--|--|---|--|---|--|
| Butryn et al. (2011)¹ USA | Setting & participants University campus, students Ethnicity (T) Caucasian (57.2%), African American (7.4%), Hispanic (1.9%), Asian (13%); Native American (1.9%), Other (18.6%) n (% female) T = 54 (100%); ACT = 35 (100%) C = 19 (100%) Mean age (SD) T = 23.1 (3.8); ACT = NR; C = NR | ACT vs group- based education | Four hours | Number of visits to athletic centre BMI PHLMS PAAAQ DDS | Evaluation of an exercise intervention. Increase in physical activity and DDS scores for the ACT group. For both groups, follow-up analysis showed increases in the PAAAQ and awareness subscale of the PHLMS between baseline and follow- up. | ↑Physical activity: ACT > C ($r = .29$) |
| Forman et al. (2013)² USA | Setting & participants Community, General public Ethnicity | ABT (ACT) vs. SBT | 7.5 hours | BMI, PFS, EES, EI, FAAQ | Weight loss in both groups, but more so when treatment was delivered by experts. More | ↓Emotional eating (EES): ACT > C ($r = .20$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|--|--|---|--------------------------------|------------------------------------|--|---|
| | Caucasian (62.3%); African American (24.6%); Asian (1.6%) Hispanic (3.8%) n (% female) T = 128 (NR); ACT = 74 (NR); C = 54 (NR) Mean age (SD) T = 45.69 (12.81); ACT = 46.21 (12.91); C = 44.98 (12.76) | | | | weight loss in ABT (ACT) than SBT group (13.17% vs 7.54%) and at 6 month follow-up (10.98% vs 4.83%). Improvements in emotional eating, disinhibition and responsivity to food cues. | ↓Disinhibition (EI): ACT > C ($r = 0.21$) ↓Weight, post TX: ACT = C ($r = 0.12$); FU: ACT = C ($r = .09$) ↓Weight (expert-led), post TX: ACT > C ($r = .31$) |
| Gregg et al. (2007)³ USA | Setting & participants Community centre, Type II diabetes Ethnicity Caucasian (23.5%); African American (9.9%); Hispanic (28.4%); Native American (1.2%); | ACT vs. education workshop for diabetes manage. | Four hours | BMI, glucose levels, AADQ | Explored the impact of ACT on diabetes self-management behaviours and glucose control. | ↑Self-management (exercise, diet & glucose scores): ACT > C ($r = .32$). |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|--|--|-----------------|--------------------------------|----------|--|--|
| | Asian Pacific Islander (29.6%); Arabic (3.7%); Other (3.7%). n (% female) T = 81 (46.9%); ACT = 43 (48.8%); C = 38 (57.9%) Mean age (SD) T = 50.9 (NR); ACT = 51.9 (NR); C = 49.8 (NR) | | | | At three month follow-up, those in the ACT condition were able to use coping strategies and reported better diabetes self-care, and glycated haemoglobin values in the target range. | |
| Juarascio et al. (2010) ⁴ USA | Setting & participants University student counselling centre, post-baccalaureate students Ethnicity Caucasian (71%); African American (5%); Asian (13%); Latino (2%) n (% female) T = 55 (92.6%); ACT = 27 (NR); | ACT vs. CT | Two hours | EPI | ACT vs. CT for comorbid eating pathology. CT led to decreases in eating pathology but ACT produced larger decreases. | ↓Eating pathology (EPI): ACT > C ($r = .28$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|--|--|---|--------------------------------|---|--|---|
| | C = 28 (NR) Mean age (SD) T = 26 (5.71); ACT = NR; C = NR | | | | | |
| Katterman et al. (2014)⁵ USA | Setting & participants University, female college students Ethnicity Caucasian (62%); African American (11%); Asian American (11%); Pacific Islander (7%); Other (9%) n (% female) T = 58 (100%); ACT = 29 (100%); C = 29 (100%) Mean age (SD) T = 22.35 (2.89); ACT = NR; C = NR | ACT vs. assessment only control group | 10 hours | BMI, physical activity, Uncontrolled and emotional eating | Examined the efficacy of ACT-based treatment in facilitating weight gain prevention. ACT-based group produced reductions in BMI and weight which was maintained at one year follow-up. | ↓Uncontrolled eating (TFE-Q): ACT = C ($r = .16$) ↓Emotional eating (TFE-Q): ACT = C ($r = .00$) ↑Exercise: ACT = C ($r = .21$) ↓Weight: ACT > C ($r = .38$) BMI: ACT > C ($r = .35$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|--|---|--------------------|--------------------------------|--------------------------------|---|---|
| Lillis et al. (2009)* ⁶ USA | Setting & participants Community weight loss clinic, previously on a diet. Ethnicity For ACT: Caucasian (95%); Hispanic Latino (5%) n (% female) T = 84 (90%); ACT = 40 (95%); C = 44 (86%) Mean age (SD) T = 50.6 (11); ACT = 49.8 (9.8); C = 51.7 (12.7) | ACT vs. WLC | Six hours | BMI, ORWELL, WSQ | Examined the effectiveness of ACT for improving the lives of obese individuals. At follow-up there were improvements in obesity- related stigma, quality of life, psychological distress, body mass, distress tolerance and general and weight specific acceptance and psychological flexibility. | ↓BMI (3 month follow-up): ACT > C ($r = .30$) |

Further data presented in:

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|---|-----------------------------------|--------------------------------|--------------------------------|--|---|---|
| Gifford et al. (2009) ⁷ | | | | BMI, AIS | Reductions in avoidance and inflexibility for ACT, useful for weight control | |
| Lillis et al. (2008) ⁸ | | | | AAQ-W, ORWELLS | Examining the impact of ACT on avoidance and inflexibility. The AAQ tool shows promise. | |
| Lillis et al. (2011) ^{*9} | | | | BMI, AAQ | Examined the effectiveness of ACT on binge eating and weight reduction and psychological processes. ACT condition reported less binge eating leading to weight loss reductions. | ↓Binge eating (self-reported frequencies): ACT > C ($r = .24$) |
| Moffitt et al. (2014) ¹⁰ Australia | Setting Community Ethnicity | ACT vs. pedometer- based | 1.8 hours | Pedometer- based step count, level | Examined the effectiveness of an ACT DVD for physical activity initiation. | ↑Physical activity (IPAQ): ACT > C ($r = .31$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|---|--|--------------------------|--------------------------------|---|---|---|
| | NR n (% female) T = 59 (83%); ACT = 32 (84%); C = 27 (81%) Mean age (SD) T = NR; ACT = 43.47 (12.21); C = 43.93 (10.33) | walking programme | | of physical, AAQ, VLQ, Goals, BMI | ACT led to greater increases in physical activity and a higher average step count. | ↑Step count: ACT > C ($r = .43$) |
| Pearson et al. (2012)¹¹ USA | Setting University and community Ethnicity NR n (% female) T = 73 (100%); ACT = 39 (100%); C = 34 (100%) Mean age (SD) T = 43.4 (14.7); ACT = NR; C = NR | ACT vs. WLC | 8 hours | BMI, EDI-II, EAT-26, AAQ-W, PEWS | ACT showed significant reductions in body-image dissatisfaction and increases in acceptance. | ↓Maladaptive eating attitudes (EAT-26): ACT > C ($r = .34$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|---|--|---|--------------------------------|---|---|--|
| Tapper et al. (2009)¹² UK | Setting Community, only participants attempting to lose weight Ethnicity NR n (% female) T = 62 (100%); ACT = 31 (100%); C = 31 (100%) Mean age (SD) T = 41 (13); ACT = 43.9 (13.80); C = 37.6 (12.60) | ACT vs TAU (continue with normal diets) | Eight hours | BMI, DEBQ, EEQ, BES, AAQ, BPAT, physical activity | ACT participants showed increases in physical activity, compared to controls but no difference in weight loss. Results showed improvements in physical activity and weight reduction when those who did not use ACT were excluded. | ↓External (DEBQ): ACT = C ($r = -.13$) ↓Emotional eating (DEBQ): ACT = C ($r = .08$) ↓Emotional eating (EEQ): ACT = C ($r = .22$) ↓Binge eating (DEBQ): ACT > C ($r = 0.30$) ↑Diet adherence: ACT = C ($r = .24$) ↑Exercise (BPAT): ACT > C ($r = .34$) ↓BMI: ACT = C ($r = .20$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|--|--|--|--|--|---|--|
| Weineland et al. (2012) ¹³ Sweden | Setting & participants Clinical centre for minimal invasive surgery, bariatric patients Ethnicity NR n (% female) T = 39 (90%); ACT = 19 (95%); C = 20 (85%) Mean age (SD) T = 43.08 (NR); ACT = 43.89 (NR); C = 42.30 (NR) | ACT vs. TAU (standard follow-up by bariatric surgery team) | Not specified but initial module 1.5 hours | BMI, EDEQ, SBEQ, WHOQOL, BREF, AAQW | RCT of ACT for bariatric patients. Improvements in eating disordered behaviour, body dissatisfaction and quality of life for those in the ACT condition. | ↓Eating disorders (EDE-Q total): ACT > C ($r = .31$) ↓Binge eating (SBEQ): ACT > C ($r = .42$) ↓Weight ACT > C ($r = .35$) |
| <i>Further data presented in;</i> | | | | | | |
| Weineland et al. (2012b) ¹⁴ | | Follow-up six months later | | | Examined the maintenance of behaviour change at six month follow-up. | ↓Eating disorders (EDE-Q total): ACT > C ($r = .26$) |

| Author(s), year and location | Sample characteristics | Study design | Treatment length (hours) | Outcomes | Summary and key findings | Post- treatment effect size (r) |
|------------------------------------|------------------------|-----------------|--------------------------------|----------|--|--|
| | | | | | ACT participants maintained gains in quality of life and body dissatisfaction. Both groups maintained improvements in eating disordered behaviours. | ↓Binge eating (SBEQ): ACT = C ($r = .18$) |

Note: Vertical arrows (↓/↑) indicate direction of desired change for each outcome measure. For comparative effect sizes (i.e., ACT vs. C), positive values of r favour ACT: Indicating that ACT produced relatively larger effects in the desired direction of change. Relational operators (</=>) signify statistical conclusions reported in the original study: “ACT = C” denotes statistical equivalence; “ACT > C” denotes a statistically significant difference favouring ACT. r values indicate effect sizes, where $r = 0.1$ indicates a small effect size, $r = 0.30$ indicates a medium effect size, and $r = 0.50$ indicates a large effect size; T (Total); ACT (Acceptance and Commitment Therapy condition); C (Control condition); NR (Not Reported); TX (Treatment); NA (Not Available); EES (Emotional Eating Scale); EI (Eating Inventory); EPI (Eating Pathology Inventory); DEBQ (Dutch Eating Behaviour Questionnaire); EEQ (Emotional Eating Questionnaire); BES (Binge Eating Scale); EDE-Q (Eating Disorders Examination Questionnaire); SBEQ (Subjective Binge Eating Questionnaire); BMI (Body Mass Index); PHLMS (Philadelphia Mindfulness Scale); DDS (Drexel Defusion Scale); EPI (Eating Pathology Inventory); AIS (Avoidance and Inflexibility Scale); AAQ-W (Acceptance and Action Questionnaire for weight); VLQ (Value Living Questionnaire); PAAQ (Physical Activity Acceptance and Action Questionnaire); ABT (Acceptance Based Therapy); SBT (Standard Behavioural Treatment); CT (Cognitive Therapy).

3.2 Treatment outcomes

Treatment outcomes included changes in eating behaviour, exercise and weight. Effect size calculations between treatment and control groups are outlined below according to differences in these outcomes. Heterogeneity of studies (e.g., variability in terms of outcomes, control conditions, and intervention characteristics) precluded meaningful use of formal meta-analysis; we instead used effect size estimates for individual studies to enable descriptive comparisons.

3.2.1 Effect of ACT-informed interventions on weight outcomes

A total of six papers based on five studies focused on weight or BMI as an outcome (Tapper et al., 2009; Lillis et al., 2009; Katterman et al., 2014; Forman et al., 2013; Gifford & Lillis, 2009; Moffitt & Mohr, 2014). In all studies, weight changed in a direction favouring ACT over control conditions. The largest effect size was medium ($r = .38$) (Katterman et al., 2014) in this case ACT was more beneficial than an assessment only control group. In another study (Forman et al., 2013) the effect sizes differed for weight depending on whether the intervention was delivered by an experienced therapist ($r = .31$), in comparison to when delivered by a novice ($r = .12$).

3.2.2 Effect of ACT-informed interventions on eating-related outcomes

A total of five studies measured a range of eating behaviours using a variety of measures: including emotional eating (EES, DEBQ, EEQ), binge eating (BES, SBEQ), eating pathology (EPI), and maladaptive eating attitudes (EAT-26). Effect sizes in the area of eating-related outcomes ranged from $r_s = -.13$ (Tapper et al., 2009) to $.28$ (Juarascio et al., 2010). (Refer to Table 2 for the effect sizes for each individual measure). The effect sizes ranged from $.18$ (Weineland et al., 2012b) to $.42$ (Weineland et al., 2012) for measures of binge eating. Most studies observed effects in a direction favouring ACT, although effect sizes were variable and generally in a range of small magnitude.

3.2.3 Effect of ACT-informed interventions on activity-related outcomes

A total of five studies examined the effect of an ACT intervention on physical activity; all identified changes in a direction favouring ACT over control conditions (Tapper et al., 2009; Butryn et al., 2011; Katterman et al., 2014; Gregg et al., 2007;

Weineland et al., 2012b). The effect sizes ranged from .21 (Katterman et al., 2014) to .43 (Moffitt & Mohr, 2014). The largest effect size was found in a study which used step-count (i.e. the number of steps taken in a day) as the means of measurement in comparison to treatment as usual which consisted of a pedometer based walking programme (Moffitt & Mohr, 2014). Other studies used self-report questionnaires such as the BPAT (.34) (Tapper et al., 2009) or the IPAQ ($r = .31$) (Moffitt & Mohr, 2014).

3.3 Methodological quality of included studies

In order to assess the inter-rater reliability of the quality appraisal tool, 25% of the studies (selected at random) were independently rated by two authors (MJ and NM). The kappa coefficients for each of the 23 items ranged from .50 to 1 (i.e., between 'moderate' and 'perfect' agreement), with a mean across items of .89 - indicating 'near perfect' agreement (e.g., Viera & Garrett, 2005). Inter-rater reliability in this study compared favourably with inter-rater reliability in previous publications applying the same tool (POMRF): For example, Öst (2014) reported an average kappa of .73 (with item coefficients again ranging from .50 to 1). Final ratings (presented in Table 3) represent scores agreed between the authors after independent appraisals and discussion of any discrepancies.

The POMRF rating scale employed does not allow comparative measurement across studies given their heterogeneity, although it does provide a comprehensive account of methodological strengths. The findings suggest that with the exception of five studies (Tapper et al., 2009; Pearson et al., 2012; Weineland et al., 2012; Katterman et al., 2014; Weineland et al., 2012b), most studies were methodologically sound. However, caution should be exercised here as this is a subjective judgement based on modal responses for each study. Therefore, it is important to consider each study in turn; this is especially important considering the heterogeneity of the studies included in this review.

When interpreting the findings of the quality assessment it is important to note that some of the papers were written by a small number of authors, for example, of the 14 identified papers, three (Lillis et al., 2011; Gifford & Lillis, 2009; Lillis & Hayes, 2007) were based on the same data set (Lillis et al., 2009). Furthermore, one other paper (Weineland et al., 2012b) was a follow-up of another study (Weineland et al., 2012). These papers, particularly those by Lillis and colleagues are considered key

evidence in this area and widely cited which limits the generalisability of the findings. This issue was taken into account in the current review whereby the population count was based on the original studies only.

Given the comprehensiveness of the quality assessment tool, a narrative summary of the ratings will be grouped together in line with relevant risks of bias (attrition, detection and reporting), as identified by the Cochrane Collaboration (Higgins et al., 2011) and two other categories considered appropriate (sample and measures bias, treatment delivery bias). Using this quality assessment, the methodological strengths and limitations are highlighted below.

3.3.1 Sample and measures bias

With the exception of one study (Pearson et al., 2012), the remainder of studies clearly described the sample (for example, reported inclusion and exclusion criteria and demographics). All studies had a representative sample, used specific outcome measures which were also considered psychometrically sound. However, assessor training and accuracy were not specified in any of the included studies. This may have influenced the results either positively or negatively.

3.3.2 Reporting bias

The identified studies varied in the number of ACT processes included as part of their intervention, ranging from drawing on two ACT-related processes (Katterman et al., 2014; Gregg et al., 2007) , three ACT-related processes (Butryn et al., 2011; Gregg et al., 2007) and four or more ACT-related processes (Tapper et al., 2009; Pearson et al., 2012; Lillis et al., 2009; Weineland et al., 2012 Juarascio et al., 2010; Lillis et al., 2011; Weineland et al., 2012b). Only five studies (Tapper et al., 2009; Lillis et al., 2009; Forman et al., 2013; Gregg et al., 2007; Lillis & Hayes, 2007) explicitly reported conducting a power analysis prior to data collection. The majority of studies only included pre- and post- assessment points, except for three studies which included follow-ups (Lillis et al., 2009; Katterman et al., 2014; Moffitt & Mohr, 2014).

3.3.3 Detection bias

The use of blind evaluators was only reported in two of the studies (Tapper et al., 2009; Forman et al., 2013). Assignment to treatment was randomised in all included studies, however only three studies (Lillis et al., 2009; Juarascio et al., 2010; Gregg et al., 2007) provided a detailed description of the randomisation process. In terms of design, half of the studies employed passive waiting list controls and the other half had active waiting list controls or treatment as usual.

3.3.4 Treatment delivery bias

Apart from one study (Juarascio et al., 2010), the remainder of studies were based on manualised treatment programmes. At least two therapists facilitated ACT interventions in the studies by Butryn et al. (2011), Juarascio et al. (2010), and Forman et al. (2013). The remainder of studies employed three or more therapists with the exception of one study (Moffitt & Mohr, 2014) which used a DVD as a means of delivering the treatment content. The implications of using a media format as opposed to a therapist face to face highlights the heterogeneity of the data and this format may serve as a confounding variable. Therefore, further research is required because there is evidence to suggest that the therapeutic alliance is a significant predictor of change (Lambert & Barley, 2001). Two studies (Weineland et al., 2012; Gregg et al., 2007) employed therapists with limited experience (for example, students with limited clinical training or experience), whereas the remaining studies specified that the ACT intervention was delivered by therapists with moderate or extensive clinical experience (Tapper et al., 2009; Pearson et al., 2012; Lillis et al., 2009; Juarascio et al., 2010; Forman et al., 2013).

Checks for treatment adherence and therapist competence were subject to methodological bias because they were neglected by the majority of studies. For example, only four studies (Juarascio et al., 2010; Katterman et al., 2014; Forman et al., 2013; Tapper et al., 2009) carried out checks on treatment adherence by assessing a portion of tapes or providing weekly supervision. Furthermore only two studies (Juarascio et al., 2010; Tapper et al., 2009) assessed therapist competence. Clearly, it is difficult for studies to be confident that the intervention applied was the one planned if they have not made these checks, thus jeopardising the accuracy of the conclusions that may be drawn. Only two studies (Forman et al., 2013; Gregg et al., 2007) controlled for concomitant treatments such as medical or psychological

treatments in their design. This therefore limits the conclusions which can be drawn as it is not known how much of the change may have been attributed to ACT or other processes.

3.3.5 Attrition bias

All studies appeared to handle attrition fairly by describing the proportions and conducting intention to treat analysis. Only one study had no attrition (Weineland et al., 2012b) but this was the six month follow-up based on the data from an earlier study which had participant drop-out (Weineland et al., 2012). Adequate statistical methods were used and there was good reporting of means and standard deviations for all studies.

Table 3. *Methodological quality of studies, drawing on the POMRF criteria*

| Study | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| number" | | | | | | | | | | | | | | |
| Bias indicator | | | | | | | | | | | | | | |
| 1. Clarity of sample description | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 |
| 2. Representativeness of the sample | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 |
| 3. Specificity of outcome measures | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 4. Reliability and validity of measures | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 |
| 5. Use of blind evaluators | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 6. Assessor training | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7. Assignment to treatment | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 8. Design | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 |
| 9. Power analysis | 0 | 2 | 1 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 0 | 1 | 0 | 0 |

| | Study number" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--|------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| 10. Assessment points | | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 11. Manualised, treatment | | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 12. Number of therapists | | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | X | 2 | 0 | 0 | 0 |
| 13. Therapist training/experience | | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | X | 2 | 1 | 0 | 0 |
| 14. Checks for treatment adherence | | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | X | 0 | 1 | 0 | 0 |
| 15. Checks for therapist competence | | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | X | 0 | 1 | 0 | 0 |
| 16. Control of concomitant treatments | | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17. Handling of attrition | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |

| Study number" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| 18. Statistical analyses and results | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| 19. Equality of therapy hours | 2 | 2 | 1 | 2 | X | 1 | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 0 |
| 20. Intervention comparison | 2 | 2 | 2 | 2 | X | 0 | 0 | 0 | 0 | 2 | X | 0 | 2 | 2 |
| 21. ACT or ACT-informed | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| 22. No. of ACT processes | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 23. Clear behavioural outcomes | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 2 | 2 |
| Modal rating | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 1 | 1* | 1* |

Note: 0 = Poor; 1 = Fair; 2 = Good; X =N/A.

"Please refer to table 2 to find the corresponding reference for each study number.

Even number of 0's and 2's ratings, so 1 has been selected.

** Please note that study numbers ⁷⁻⁹ are based on the data set used by study⁶. Also study¹⁴ is the follow-up of study¹³ and uses the same data set.

4. Discussion

4.1 Summary of research findings

ACT is being increasingly used as a treatment for weight management. There have been no systematic reviews published exploring its effectiveness in this area. Therefore, this review was timely and contributes to our understanding by synthesising findings from a range of studies and meeting the aim of the review. Overall, this review indicates modest support for pure ACT and its variants as a helpful intervention in the field of weight management. This was evident by the positive influence of ACT on lifestyle change, namely, eating behaviour, physical activity and weight-related outcomes. However, although there was a significant difference between ACT and control conditions, it is noted that the effect sizes were small in some studies which should be considered when drawing conclusions from this review. Furthermore, statistical significance does not always imply clinical significance.

In terms of the impact of ACT in achieving weight management, six papers based on five studies examined weight-related outcomes (Tapper et al., 2009; Lillis et al., 2009; Katterman et al., 2014; Forman et al., 2013; Weineland et al., 2012; Lillis & Hayes, 2007). The reviewed evidence suggested that ACT proves promising in aiding weight management in the desired direction depending on the target population. For example, weight gain for those with eating disorders (Juarascio et al., 2010) with medium effect sizes ($r = .28$) and weight loss for post-bariatric clients (Weineland et al., 2012) with medium effect sizes ($r = .35$). This finding supports the concept of ACT for promoting psychological flexibility, and thereby allowing clients to take action in the desired/values-consistent direction (whether in terms of weight reduction, gain or maintenance) (Hayes et al., 2006).

The long term effectiveness of ACT for weight management cannot be concluded as only three studies included a follow-up (Lillis et al., 2009; Gregg et al., 2007; Weineland et al., 2012b); although small to medium effect sizes in the areas of eating behaviour were reported. The longest follow-up period was six months (Weineland et al., 2012b) which may not be long enough for maintaining change especially as weight regain is common after weight loss (Byrne et al., 2003).

Six studies examined effects of ACT on emotional eating and binge eating – as behaviours that are often implicated in weight management difficulties (Tanofsky-Kraff et al., 2007; Canetti, Bachar & Berry, 2002). ACT and ACT-informed

interventions were found to be modestly effective in reducing emotional eating from pre- to post- intervention. Of the three studies (Tapper et al., 2009; Katterman et al., 2014; Forman et al., 2013) which assessed emotional eating, improvements were found with small effect sizes. In consideration of these studies, the quality assessment indicated poor ratings in the areas of checking therapist competence and treatment fidelity, as well as a lack of control in studies whereby participants may have been involved in other treatments (psychological or pharmacological), which may have influenced treatment outcome. However it is possible that the studies took these points into account but neglected to report this information.

ACT-based interventions were found to have greater effectiveness for binge eating. The studies by Tapper et al. (2009), Weineland et al. (2012), Lillis et al. (2011), Weineland et al. (2012b) examined the impact of ACT on binge eating behaviour and found medium effect sizes. These effect sizes are similar to alternative treatments for binge eating, for example, mindfulness meditation (Katterman, Kleinman, Hood, Nackers & Corsica, 2014b) and Dialectical Behaviour Therapy (Telch, Agras & Linehan, 2001).

Of the included studies, five (Tapper et al., 2009; Butryn et al., 2011; Katterman et al., 2014; Gregg et al., 2007; Moffitt & Mohr, 2014) considered the impact of ACT on increasing exercise. ACT was found effective in the initiation of physical activity in all studies with medium effect sizes (ranging r s from .21 - .43). However, these findings should be interpreted cautiously particularly as the quality assessment indicated issues in most of these studies, such as the failure to report or use blind evaluators, conduct a power analysis or treatment fidelity checks, which limits the generalisability of these findings.

It is also important that the effect sizes of activity-related outcomes are considered in line with recommendations (King et al., 2012). King and colleagues acknowledged that there are issues with studies which assess the efficacy of exercise to promote better weight management in that often individual variability is disregarded and mean data are the main reference used. This is problematic because it fails to consider an individual's response to exercise which may differ with some individuals potentially compensating for their increased activity by consuming more food (King et al., 2012). Of the five studies which looked at physical activity as an outcome, only two studies assessed BMI too ($r = .38$) (Katterman et al., 2014) and ($r = .20$) (Tapper et al., 2009). Therefore, more research is warranted in this area to

understand variability and how ACT interventions may be adapted in response to this. This argument for variability is not exclusive to exercise and may also be applied to the eating behaviour domain.

Half of the studies employed a waiting list control (considered the weakest possible comparison) and the other half compared ACT with an active control (considered the most rigorous comparison condition to use) (Öst, 2008). The active controls varied in all studies, ranging from educational-based programmes (Butryn et al., 2011; Gregg et al., 2007), standard behavioural treatment (Forman et al., 2013), a 12-week pedometer based programme (Moffitt & Mohr, 2014), standard treatment following bariatric surgery (Weineland et al., 2012) and one only compared ACT with cognitive therapy (Juarascio et al., 2010). All studies found slightly greater effects for the ACT group with the exception of one study (Tapper et al., 2009) with a small effect. However the heterogeneity of studies to date (across multiple variables, such as ACT delivery/modality, focal problem, population) complicates interpretation, thus making it difficult to identify variables that might moderate effectiveness.

4.2 Quality assessment

The methodological quality of the evidence was generally good considering the typically high ratings in each of the quality assessment domains overall. However considering the heterogeneity of studies, the generalisability of the findings is questionable. The quality assessment also revealed methodological limitations of some studies. These related to poor or no description of whether samples were adequately powered, poor description of assignment to treatment, little or no follow-up, lack of detail regarding how attrition was handled, little description (if any) of checks for therapist competence and treatment fidelity. These shortcomings could be easily overcome by more transparent reporting by researchers. These biases undermine the quality of studies which in turn creates ambiguity in interpreting the findings because it is not known whether the results adequately reflected the methods employed. Nevertheless, two of the included studies (Forman et al., 2013; Gregg et al., 2007) controlled for concomitant treatments in their design which is a strength. This is especially important considering how other treatment (psychological or pharmacological) could impact on outcomes. Therefore it is important that future studies control for this as doing so would strengthen the inferences which could be made.

4.3 Critique

This review is timely considering the government initiative and NHS drive to tackle obesity (Department of Health, 2011), as well as the recent surge of research using ACT. A strength of the review is the breadth of the search as expert authors in the area were contacted via the ACBS website to enquire about research to help identify all references.

The limitations of this review should also be considered. First, as ACT is a fairly new approach, there is a scarcity of studies in comparison to other treatment modalities. In addition, the research mostly consists of small sample sizes, females, Caucasian samples, little or no follow-up, failure to either check or report checks for treatment adherence and therapist competence and a lack of an active treatment comparator. Therefore, this limits the generalisability of the findings and so cautious interpretation about the usefulness of ACT treatment (Öst, 2014) should be considered. However, it is important to note that the low methodological quality of some of the studies may reflect the preliminary state of research investigating the efficacy of ACT. In order to attract funding required for long-term, definitive trials, it is necessary to conduct initial investigations which may be limited in scope (for example, sample size, length of follow-up) due to resource constraints and the exploratory nature associated with preliminary work. Although ACT studies have been critiqued for not showing improvement over time (refer to Öst, 2014), this impression may be explained by the broadening of ACT applications (in terms of ACT exploring new problem areas, each following a new development cycle, such that early studies are unlikely to be definitive). With current (ACT for weight management) studies, it's notable that all have been published in the past ten years and so are subsequently still in the early phase of identifying possible utility of ACT in this domain.

Secondly, this review focused on studies which had a randomised control. Although RCTs are considered the highest standard in research, it would have been valuable to consider other types of research design when answering this question – notwithstanding difficulties of comparing findings and effect-sizes across studies where different designs and standards of control have been used. Furthermore RCT's have been criticised for treatment being delivered by highly competent staff, which has implications for the findings as although found to be effective in that

context, this may not be the case if conducted in a standard treatment environment (Ferriter, 2011). However, this review compared and synthesised the findings across a wide-ranging area, which should be acknowledged.

Thirdly, only English peer-reviewed articles were included in this review, which means it may be subject to missing relevant articles in other languages as well as vulnerable to publication bias because it is known that studies with significant effects tend to be more readily published (Ferriter, 2011; Chan, Hróbjartsson, Haahr, Gøtzsche & Altman, 2004). This point serves as an important reminder when drawing conclusions about the effectiveness of ACT in this area. As ACT is an emerging area, there may be smaller service-evaluation or small scale studies available using ACT within the grey literature- this is perhaps an area worth exploring in future reviews.

Fourthly, ACT research is typically carried out by those who have a strong allegiance in the area which could be a confounding variable in skewing the findings (Wampold et al., 1997). Finally, although comprehensive, the quality rating scale did not include a criterion looking at ethical issues (e.g. right to withdraw) in each of the studies. This is an oversight which may have influenced the modal number of scores and differentiated the subjective rating for each study.

4.4 Implications

The evidence reviewed suggests that ACT is effective at addressing problematic eating behaviours to enable positive lifestyle changes. However, the current view is an interim perspective and therefore strong conclusions cannot be drawn but the evidence to date indicates that ACT has been useful across a range of populations and so may be transferable to other areas considering its transdiagnostic approach.

The reviewed studies highlight the following implications for clinical practice:

- Regardless of the type of eating behaviour, over or under eating, both may be addressed within the remit of ACT to influence weight management and lifestyle change. This highlights the need for training in ACT-based approaches for clinicians working in this area of clinical practice. In addition, the finding that ACT proves promising for weight management has ethical

implications in that it provides scope to potentially offer another evidence-based treatment option for clients to choose from.

- Another factor which may influence clinical practice is considering the experience of therapists when working with more challenging presentations. It was acknowledged that expert therapists enabled more change resulting in larger effect sizes (Forman et al., 2013). However, this was based on one study in this area and so further evidence is needed.
- An ACT DVD was found to be effective for increasing exercise (Moffitt & Mohr, 2014). This has implications for clinical practice due to pressures to develop cost-effective interventions with maximal ease of access (Cavanagh, Strauss, Forder & Jones, 2014). Therefore, such self-help interventions are appealing because they increase access and availability to reach those who may be inclined to decline standard treatment and they also allow the client autonomy (Cavanagh et al., 2014). There was only one such intervention method included within the scope of this review and more are needed to increase understanding of this area. It is particularly important to examine the format of treatment delivery, especially when considering that the therapeutic alliance is considered the main influential component of therapeutic change (Lambert & Barley, 2001). However, given the increase in such therapy formats, it is timely that their effectiveness is researched, and arguably by independent investigators such as clinical psychologists.

4.5 Future research

There is a need for research investigating the mechanisms of change to further understand the intricacies of ACT as a therapy, assist in clinical practice and potentially inform National Institute of Clinical Excellence (NICE) guidelines. Further research would benefit from employing more longitudinal type designs to investigate the implications of ACT for weight management in the long-term.

As we have established basic efficacy we need to understand more about the reasons why ACT is effective. Studies comparing ACT outcomes to alternative treatment modalities through process mediation, component studies and single case designs may help to identify mechanisms of change. This fits with the recommendations from the Medical Research Council (MRC), whereby guidelines for

assessing the feasibility of treatment stipulate such an approach. It would also be important to explore the effectiveness of ACT for weight management by considering studies which include both passive and active controls to determine the impact of ACT and rule out whether some of the change is a result of history and maturation effects. However, it could be argued that this should be considered as a future research agenda as the literature is in its infancy, thus reflecting its current status in relation to the process of evidence-building, whereby possible efficacy against passive considerations must first be demonstrated before examining relative efficacy.

It is suggested (Öst, 2008) that the results from studies investigating third-wave therapies are interpreted with caution given that they are in their early stages. Öst (2008) highlights further recommendations for RCT's in line with the criteria from the quality assessment used here suggesting greater focus on research methodology and reporting of data (for example, use an active comparison for treatment; use three or more therapists and consider their experience when analysing the data; include a follow-up period to assess whether the outcome is maintained). This review endorses these recommendations for future RCTs examining ACT for weight management. Please see the study by Öst (2008) for further details.

4. Conclusion

Encouraging findings for ACT and ACT-informed interventions for weight management were found within the scope of this systematic review. Considering that this is a relatively new area, the findings were promising but should be classed as preliminary as more research is needed to be confident in the conclusions drawn. This review makes recommendations for the design and reporting for researchers working in this area, as improving study quality will allow more accurate decision-making which will help inform clinical practice. Considering the obesity crisis and the struggle individuals' endure in the area of weight management, innovative approaches like ACT are needed. If weight management is effectively tackled, there would be significant positive outcomes for clients and service providers.

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* denotes articles included in the systematic review.

Appendix 1: Search strategies

PsycINFO search terms⁵

(Acceptance and commitment therapy OR acceptance adj commitment therapy)
AND (weight perception/ OR body weight/ OR weight gain/ OR weight control/ OR
weight OR weight loss/ OR behaviour change/ OR exercise/ OR weight management
OR health behaviour OR intervention/ OR obesity/ OR diets/ OR food refusal/ OR
food intake/ OR food deprivation/ OR food/ OR food preferences/ OR dietary
restraint/ OR nutrition/ OR obesity/ OR diets/ OR body weight/ OR eat OR eating
behaviour OR eating attitudes/ OR eating disorders/ OR eating/ OR diet/)

⁵ Equivalent strategies were developed for EMBASE and MEDLINE databases.

Conflict of interest

The authors declared no conflicts of interest.

Journal paper⁶

⁶ This journal paper has been prepared for submission to Appetite (no word count restriction); author guidelines may be found at <https://www.elsevier.com/journals/appetite/0195-6663/guide-for-authors#2000>. However, in line with course guidance, this journal article is within the word limit and less than 8000 words, excluding tables/figures and references. Footnotes providing additional relevant information and signposting the reader to relevant information in the extended paper are used throughout the journal paper.

Regulating eating through Acceptance and Commitment Therapy (RE-ACT):
A single case experimental design to evaluate a guided self-help intervention
for individuals who are overweight or obese and engage in emotional eating.

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Journal Abstract

Acceptance and Commitment Therapy (ACT) is considered a promising approach for addressing emotional eating, which may aid weight management. However, the mechanisms of ACT have not been explored in depth, and given the extent of the problem, an accessible modality is required. The aim of this study was to evaluate the efficacy of a brief guided self-help ACT intervention for emotional eating using a single case experimental design (SCED). Six participants completed the intervention over a five week period, five of whom completed a three month follow-up. Participants completed a range of measures, including self-report (targeting emotional eating and psychological ACT processes⁷) and behavioural (recording calorie intake and mood daily; assessment of weight). Half of the sample no longer met the criteria for “emotional eating” at follow-up. Reliable and clinically significant changes were calculated on self-report measures. All participants clinically improved on at least one ACT measure by post or follow-up. In three cases where participants reported improvements in emotional eating, all had a concurrent or a preceding change on a scale assessing “present moment awareness”. For two of these participants, these changes were coupled with improvements on measures assessing values and fusion. Simulation Modelling Analysis (SMA) revealed a decrease in emotional eating in the intervention phase compared to the baseline phase for some participants. Post-intervention, there were reductions in weight for four participants, three of whom maintained the weight loss at follow-up. Qualitative responses indicated support for the intervention with all participants considering it helpful. These initial findings, although mixed, contribute to the evidence-base exploring the utility of ACT for emotional eating and weight management. Further evaluations of this intervention are warranted, particularly considering the potential cost-saving benefits.

Keywords: Acceptance and Commitment Therapy, emotional eating, weight management.

⁷ Referred to hereafter as ACT processes.

Highlights⁸

- Evaluation of a new brief guided self-help ACT intervention for emotional eating.
- Encouraging preliminary findings for ACT with emotional eating and weight management.
- Considering the obesity epidemic, accessible modalities like self-help are needed.
- However, further evaluation of this approach is required.

⁸ Highlights from the study are a feature of the journal paper and so are included here. A rationale for the choice of target journal is included in section 1.2 of the extended paper.

Obesity is a growing health epidemic (Caballero, 2007)⁹. In 2014, approximately 39% of the world's adult population were overweight and 13% were obese (World Health Organisation, 2015). Obesity and being overweight is associated with significant health consequences (Kopelman, 2000; Rapp et al., 2005) and poses a financial burden to health services (Cawley & Meyerhoefer, 2012; Finkelstein, Trogdon, Cohen & Dietz, 2009; Withrow & Alter, 2011). However, weight loss, and its maintenance over time, is difficult, leading experts to recognise the need to consider and deal with the psychological challenges of weight management (McGuire, Wing & Hill, 1999; Cooper & Fairburn, 2001; Tapper, Shaw, Ilesley & Moore, 2007).

For some individuals, "emotional eating"¹⁰ (over-eating in response to low or elevated mood, and not in response to genuine physiological hunger; Canetti, Berry & Elizur, 2009; Ganley, 1989; Geliebter & Aversa, 2003) is an important contributory factor to weight gain, consuming more calories in response to emotions, resulting in a surplus (Ganley, 1989; Torres & Nowson, 2007). This is due to the automaticity associated with emotional eating, whereby eating is contingent on fluctuations in mood which may not be compatible with planned weight maintenance and healthy eating. Although it is recognised that there are other behaviours/risk factors¹¹ which may contribute to weight gain, interventions addressing emotional eating may be an effective means of facilitating weight management for some individuals (Tapper et al., 2009). Emotional eating may be understood conceptually as a maladaptive emotion regulation strategy in response to positive or negative psychological states (Hill,

⁹ See 1.3 in the extended paper for a critical appraisal of Body Mass Index (BMI) and a definition of obesity. See 1.4 in the extended paper for an overview of the consequences of poor weight management.

¹⁰ See 1.5 in the extended paper for detailed information regarding emotional eating, including a critique of the concept of emotional eating and an overview of the relationship between emotional eating and weight management.

¹¹ Examples include: consuming bigger portion sizes or energy-dense and highly calorific foods, having a sensitivity to rewarding food cues that may result in overeating, possible medical conditions such as an underactive thyroid, or living a sedentary lifestyle and, thus, burning less calories (Faith, Allison & Geliebter, 1997; Jabs & Devine, 2006)

Masuda, Moore & Twohig, 2015; Bongers, Jansen, Havermans, Roefs & Nedorkoom, 2013; Hays & Roberts, 2008; Polivy & Herman, 2002).

Acceptance and Commitment Therapy (ACT)¹² is a novel behavioural psychotherapeutic approach which may help reduce emotional eating by addressing experiential avoidance¹³ (Hayes, Strosahl & Wilson, 1999). Experiential avoidance offers one way of understanding emotional eating, whereby efforts to control/escape from aversive internal experiences through eating provides temporary relief by numbing, avoiding or soothing unwanted emotions (Telch, 1997; Gianini, White & Masheb, 2013; Polivy & Herman, 2002; Sim & Zeman, 2006; Hayes et al., 1999). ACT may assist an individual to actively experience emotions and cravings and subsequently engage in healthy behaviour (Forman et al., 2012). The premise of ACT is that by helping an individual to “accept” and “defuse” from aversive internal experiences (thoughts and emotions), whilst living in the present moment, may increase the likelihood the individual will be able to live a meaningful life in line with their values (Forman & Herbert, 2009). For example, an individual who has certain values around physical health but is struggling with emotional eating, ACT may help by putting them in contact with their values, and assist them to make informed choices by increasing their moment-to-moment awareness. Furthermore, ACT may also support the individual in being more “accepting” of their urges so they are not directly responding to emotions over values.

Instead of directly targeting discrete psychological difficulties, ACT aims to alter the function of psychological events and reduce psychopathology by increasing psychological flexibility - the ability to experience difficult feelings

¹² ACT is comprised of six processes; “acceptance” (embracing feelings for what they are, without resistance); “cognitive defusion” (altering the function of thoughts by adapting their verbal functions); “being present” (non-judgemental observation of experiences in the moment); “self-as-context” (considering the self as more than thoughts, feelings, and physical sensations whilst being receptive to experiencing changing emotions); “values” (chosen qualities based on what the individual considers as important); “committed action” (relates to changes in behaviour that are guided by an individual’s values) (Hayes, Luoma, Bond, Masuda & Lillis, 2006).

¹³ See section 1.6 in the extended paper for detailed information on ACT, including an overview of the underpinning theory, additional details of the ACT processes, and a critical appraisal of ACT.

while pursuing values-based action so as to enhance the individual's quality of life (Hayes et al., 1999). By doing so, ACT may be able to equip an individual with the psychological strategies required to foster weight loss/management and reduce emotional eating. Furthermore, interrupting the behavioural cycle associated with emotional eating may have a secondary side-effect of symptom reduction (Hayes, Wilson, Gifford, Follette & Strosahl, 1996; Lillis, Hayes, Bunting & Masuda, 2009).

Although CBT is well established as a classic behavioural intervention for weight management¹⁴ (Fairburn & Harrison, 2003); there are theoretical reasons why ACT may be more useful, particularly in the longer-term. ACT may have advantages over CBT¹⁵ for addressing emotional eating because it aims to help the individual “accept” the emotional consequences and cope better (Hayes et al., 2006; Hayes, 2004). Given that experiential avoidance is considered by researchers in the field to be the main mechanism involved in emotional eating, it is likely that some of the strategies within CBT (e.g., challenging thoughts) may be counterproductive (Marcks & Woods, 2005; Shaw, O’ Rourke, Del Mar & Kenardy, 2005). In fact, from an ACT stance, attempts to change aversive internal experiences are likely to be unsuccessful by serving to facilitate or maintain experiential avoidance and contribute to increased distress (Gregg, Lillis & Schmidt, 2015). Furthermore, there is evidence that not all clients with emotional/psychological difficulties¹⁶ can benefit from a CBT approach or to an extent that is clinically significant in maintaining change (Arch & Craske, 2008; Wisniewski, Safer & Chen, 2007). This may be particularly true for individuals who are identified as “emotional eaters” (Lillis et al., 2015).

¹⁴ Standard Behavioural Treatment (SBT) is based (in part) on CBT. Therefore, in the literature CBT may be referred to as SBT to differentiate it from newer forms of behavioural interventions like ACT (Forman & Butryn, 2015). SBT mainly consist of behaviour therapy techniques (e.g., self-monitoring) and cognitive techniques (e.g., thought restructuring) in conjunction with dietary and physical activity-related prescriptions (Butryn, Webb & Wadden, 2011; Forman & Butryn, 2015).

¹⁵ See 1.7 in the extended paper for an overview of theories of emotional eating (relational and cognitive/appraisal-based).

¹⁶ May be termed “treatment resistant” (see Kenny & Williams, 2007).

Standard behavioural treatments (SBT), like CBT, typically result in small weight reductions which are not sustained over time (Booth, Prevost, Wright & Gulliford, 2014; Fontaine & Cheskin, 1997). Furthermore, the processes/mechanism of change in such interventions in weight management research are often poorly informed by behavioural science theory (Booth et al., 2014) or lack a sufficient explanation of treatment gains in accordance with CBT theory (e.g., see Longmore & Worrell, 2007). Arguably, existing interventions are not dealing effectively with obesity given its prevalence. Therefore, alternative possibilities of treatment should be investigated. There is at least a theoretical case for ACT, so its efficacy should be assessed.

Studies have shown that ACT-based approaches can enable behavioural change and improve health outcomes (Powers, Zum Vorde Sive Vording & Emmelkamp, 2009). Researchers have demonstrated that acceptance-based methods are useful for a range of health concerns that also seem to be characterised by experiential avoidance, including coping with food cravings, helping disordered eating attitudes, and improvements in weight-specific acceptance (Pearson, Follette & Hayes, 2012; Hooper, Sandoz, Ashton, Clarke & McHugh, 2012; Lillis et al., 2009; Manlick, Cochran & Toon, 2013). Additional benefits of acceptance-based approaches include increased body satisfaction, quality of life, and physical exercise (Tapper et al., 2009; Weineland, Arvidsson, Kakoulidis & Dahl, 2012). The latter ultimately leads to weight loss due to the calories burned, particularly helpful for those who struggle with emotional eating (Forman, Butryn, Hofmann & Herbert, 2009; Niemeier, Leahey, Reed, Brown & Wing, 2012; Juarascio, Forman, & Herbert, 2010)¹⁷.

There is preliminary evidence supporting the implementation of brief ACT interventions for weight management. For example, a study by Lillis et al. (2009) found a one day ACT intervention helpful in increasing psychological flexibility and maintaining weight loss, but neglected to include a measure of emotional eating. Furthermore, although interventions have typically been

¹⁷ See 1.8 in the extended paper for an overview of the existing literature of ACT for emotional eating and weight management. See 1.9 for a rationale for selecting ACT for emotional eating and weight management. See 1.10 for further information on how this research fits into the wider trajectory of developing a potential tool for this health problem.

delivered face-to-face, within the literature advocating ACT, there is evidence that it can be efficacious in various formats, including self-help (Cattivelli et al., 2015; Cavanagh, Strauss, Forder & Jones, 2014)¹⁸.

A small number of ACT self-help resources have shown promise for different populations. For example, an ACT self-help intervention for chronic pain resulted in improvements in quality of life and engagement in valued living for participants (Johnston, Foster, Shennan, Starkey & Johnston, 2010). Whilst there is some support for ACT self-help interventions (Cavanagh et al., 2014), there is a dearth of literature specifically relating to ACT self-help approaches for emotional eating and weight management. Recently, new self-help approaches for weight management have been developed, although not yet evaluated; namely “The Diet Trap” (Lillis, Dahl & Weineland, 2014) and “The Weight Escape” (Ciarrocchi, Bailey & Harris, 2014)¹⁹. The benefits of self-help is that they are relatively inexpensive, accessible, and resource efficient (Butryn et al., 2011; Cuijpers, 1997). Guided self-help²⁰ has been considered as more effective than self-help alone (Richards & Richardson, 2012). Self-help approaches to weight loss are vital in addressing the obesity crisis by allowing the dieter to be the primary facilitator of change (Butryn, Kerrigan & Kelly, 2012).

Although early findings are encouraging, ACT research for disordered eating is in its infancy in comparison to predominant therapeutic models, like CBT. More evidence for the efficacy of ACT is needed (Hill et al., 2015). It is recommended by ACT proponents that studies should investigate feasibility and acceptability, explore mechanisms of change and whether or not ACT targets the hypothesised variables, and if the process/outcome variables behave as predicted (Gaudiano, 2011). A single case experimental design (SCED) is a useful way of investigating the efficacy of ACT given the uncertainty around relevant processes which may be related to weight loss/gain. SCEDs have the

¹⁸ See 1.11 in the extended paper for information on self-help interventions and ACT, and the rationale for selecting a brief self-help format in this study.

¹⁹ The former text was chosen based on readability (more accessible and lower participant burden), discrimination of ACT processes and consideration of emotional eating, this decision process is described in more detail in the method section.

²⁰ The provision of minimal support.

potential to address questions relating to the mechanisms of change and determine the efficacy of ACT.

There is a lack of research examining ACT for emotional eating using SCEDs and so there is limited information to draw comparisons. However, recently investigators (Hill et al., 2015) have applied SCED to emotional eating in order to increase understanding at an individual level about the effectiveness of ACT. Two overweight individuals self-identified as “emotional eaters” engaged in ten individual face-to-face weekly sessions of ACT. There was a reduction in the number of emotional eating episodes and an increase in body image flexibility post-intervention. However, this study failed to assess weight post-intervention and so it is unknown whether changes in eating habits had clinical implications in terms of better weight management. Although the latter is not a primary aim of ACT, it is important from a public health perspective. As such, the present study employed a SCED²¹ with six individuals who were identified as “emotional eaters” in order to explore whether ACT would reduce emotional eating and aid weight management, and address some of the weaknesses of previous research in this field.

Given the obesity epidemic²², it is imperative research increases our understanding of the efficacy of ACT self-help as a viable intervention option for emotional eating. Considering the speculated role of experiential avoidance in emotional eating and how emotional eating links with obesity, as well as the promising findings of brief self-help interventions, a SCED is a useful way of exploring the efficacy of ACT and enhancing our understanding further. The overarching objective of this study was to examine the impact of a guided self-help ACT intervention for emotional eating and weight management. To accomplish this aim, this study set out to investigate the effectiveness of this intervention with specific questions, drawing on multiples sources of evidence, whilst considering a series of hypotheses (see Table 4)²³.

²¹ See 1.12 in the extended paper for further information relating to SCED. See 1.13 for information relating to the Implicit Relational Assessment Procedure (IRAP), an implicit measure used for exploratory purposes in this study, which is covered in the extended paper.

²² See 1.14 in the extended paper for further discussion of the rationale for this project.

²³ See 1.15 in the extended paper for sub-aims of this study.

Table 4.

Research questions, sources of evidence and hypotheses*

| Questions | Sources of evidence | Hypotheses |
|---|--|--|
| Does outcome change? Does emotional eating change following the introduction of an ACT intervention? And if so, are any improvements in emotional eating congruent with changes in weight? | Emotional eating screening measure ²⁴ ; Emotional eating self-report measure ²⁵ ; association between daily mood and calorie intake; changes in weight; qualitative data from change interviews. | The primary hypothesis is that there will be a reduction on the screening measure and participants will no longer meet the clinical threshold for emotional eating. Additionally, there will be a reliable and clinically significant improvement in the self-report emotional eating measures, a reduction in weight (for those who responded positively to emotional eating measures), and a decreased association between eating (calorie intake) and emotions (positive and negative) from baseline to intervention. |
| Does process change? Do psychological processes that are theoretically targeted by ACT (referred to hereafter as ACT processes) change | Self-report ACT-specific measures; qualitative data from change interviews. | The ACT intervention will result in reliable and clinically significant improvement in ACT-specific processes, including values, fusion, acceptance and present moment awareness ²⁶ . Components of ACT will be rated favourably in change interviews. |

²⁴ This is the primary outcome and priority measure because participants were identified as “emotional eaters” and screened into the study on this basis. This is also the standard method used in research (Neimeier et al., 2012; Lillis et al., 2015). Researchers have also indicated that higher levels of emotional eating is predictive of poorer weight loss outcomes (Neimeier, Phelan, Fava & Wing, 2007; Butryn, Thomas & Lowe, 2009; Hays & Roberts, 2008; Wing & Phelan, 2005).

²⁵ See 1.13 in the extended introduction for information on an implicit measure which was used in this study. Due to restrictions on word count, this is focused on entirely in the extended paper.

²⁶ See 1.6.2 in the extended paper for a detailed overview of the ACT processes. The target journal has previously published studies on ACT (e.g., Forman & Butryn, 2015) and its readership is considered familiar with ACT. Therefore, for the purposes of the submission, the definitions provided previously in footnote ⁷ were considered sufficient.

Table 1.

Continued

| Questions | Sources of evidence | Hypotheses |
|--|---|---|
| following the introduction of the ACT intervention? | | |
| Does outcome link to process? | | |
| Are any observed changes in emotional eating attributed to the ACT intervention? | Consideration of external events/factors; changes in ACT processes preceding changes in emotional eating measures; qualitative data from change interviews. | It is tentatively predicted that the ACT processes may change prior to changes in emotional eating. Participants may consider the intervention responsible for change and provide positive ratings. |

Note: *These three questions apply to intervention research and are in line with recommendations by Elliott (2002).

Method²⁷

Design

This study utilised a mixed methods non-concurrent multiple baseline across participants, single-case series using an A-B design (Barlow & Hersen, 1984) with a three month follow-up.

Participants

Six females from a university student population participated (age range; 19 to 37 years, mean age; 27 years)²⁸. Participants were eligible to take part in the study if they met the following criteria: (a) aged 18 years or older; (b) able to read and write English so as to understand the self-help materials and provide written informed consent; (c) able to commit to the proposed time frame of the intervention; (d) self-reported that they were not currently experiencing acute or severe/enduring psychological difficulties that might hinder participation; (e) had a Body Mass Index (BMI) over 25; and (f) scored five or more on the Internal Disinhibition subscale of the Eating Inventory²⁹ (Stunkard & Messick, 1985) in order to be identified as an “emotional eater”.

Individuals were excluded from the study if they self-reported that they were currently pregnant, engaged in another weight loss programme, previously diagnosed as having an eating disorder or were on the waiting list for bariatric surgery, or had already received this procedure. Individuals were also exempt from taking part if they could not attend the face-to-face meetings to complete the BMI assessment. No participants dropped out of the intervention, however, one individual did not complete the baseline phase and was replaced by another participant. All participants, except one (P1), attended the three month follow-up meeting.

²⁷ See 2.1 in the extended paper for information regarding epistemology.

²⁸ See 2.2 in the extended paper for information justifying the sample size.

²⁹ Scale described in measures section below.

Anthropometric and demographic³⁰

Body weight was measured in light clothing using a digital scale and height was measured without shoes using a stadiometer. BMI was calculated by formula (kg/m^2). BMI is the standardised method used in clinical practice, is quick, non-invasive and has demonstrated adequate convergent validity with other measures of body fat, for example, dual energy x-ray absorptiometry (Pietrobelli, Wang, Formica & Heymsfield, 1998). Basic demographic information was also recorded, such as age, gender, occupation and weight.

Measures

To examine the effectiveness of the ACT intervention, there was a focus on individual variability; each participant was employed as their own control and multiple measures and indices were considered. Currently no daily ACT measure which encompasses all of the ACT processes (e.g., values, acceptance, fusion and present moment awareness) has been created. For the purposes of assessing stability in the baseline phase, a bespoke ACT measure was developed to capture psychological flexibility; in designing this three items were selected from each of the four ACT measures³¹ described in Table 2, based on factor loadings and face validity.

Mood and calorie intake were assessed on a daily basis³². To assess calorie intake, participants recorded food consumption and physical activity on an electronic and freely available tool “myfitnesspal” (available at www.myfitnesspal.com), allowing them to observe their overall calorie intake. Positive and negative affect was assessed using the International Positive and Negative Affect Schedule Short Form (I-PANAS-SF; Kercher, 1992). This comprises of 10-items ranked on a five-point Likert scale; “never” (1) to “always”

³⁰ See 2.3 in the extended paper for further information on measures, and 2.3.1 for additional information on anthropometrics and demographics.

³¹ This scale can be obtained from the first author. For the purposes of this article, the focus is on the daily measure of mood and calorie intake and the self-report measures in Table 2. However, see 2.3.2 in the extended paper for further information regarding the brief ACT measure.

³² See 2.3.6 in the extended paper for information justifying the selection of the I-PANAS-SF to assess emotions and a rationale for selecting myfitnesspal.

(5). Higher scores correlate with increased intensity of each particular emotion; an example item is “thinking about yourself and how you normally feel, to what extent do you feel: Upset?”. This scale has adequate test retest reliability ($r = .84$; $p < .01$) and satisfactory convergent validity (Thompson, 2007).

Table 5 gives an overview of the quantitative battery of measures used along with the frequency of administration³³. The self-report measures were made available to each participant electronically via their own unique login on an online secure survey site. A qualitative measure, a change interview (Elliott, Slatick & Urman, 2001) was also conducted; however, this is described in further detail below³⁴.

³³ These explicit measures were also examined on a weekly basis which revealed a consistent pattern and similar temporal resolution.

³⁴ An implicit measure was also employed in this study which is not the focus of the journal paper. See 2.3.8 in the extended paper for information regarding this implicit measure, including details such as psychometric properties, development of items and information regarding administration and analysis.

Table 5.

Description of self-report measures

| Name of measure & author | Aim | Number of items | Item scaling & Anchor points | Directionality | Example item | Reliability | Validity | Frequency of administration |
|--|---|------------------------------|---|---|---|--|---|-------------------------------|
| Internal Disinhibition subscale of EI ³⁵ ; Stunkard & Messick (1985). | Cognitive restraint, disinhibition and hunger. | 8 items of a 51 item scale. | Four-point scale; “never” (1) to “always” (4). | Higher scores indicate higher levels of emotional eating. | “Do you eat sensibly in front of others and splurge alone?” | IC; $\alpha = .90$ (Stunkard & Messick; 1985) TR; $r = .93$. | Criterion validity (binge eating severity correlated with factor 2 ($r = 0.61$) and factor 3 ($r = 0.54$)). | Pre, mid, post and follow-up. |
| Emotional Eating subscale of the TFEQ; De | Cognitive restraint, uncontrolled eating, and emotional eating. | 3 items of an 18 item scale. | Four-point scale; “definitely true” (4) to “definitely false” (1) | Higher scores indicate more emotional eating. | “When I feel anxious, I find myself eating”. | IC; $\alpha = .80$ (Karlsson et al., 2000). | CV; Pearson's $r = -0.82 - 0.69$ DV; Pearson's $r = -0.59 - 0.26$ (De Lauzon et al., 2004). | Pre, mid, post and follow-up. |

³⁵ Participants were eligible to participate if they were identified as an “emotional eater”; this was determined on the basis of achieving the clinical cut-off score of five or more on this screening measure.

Table 5. *Continued**Description of self-report measures*

| Name of measure & author | Aim | Number of items | Item scaling & Anchor points | Directionality | Example item | Reliability | Validity | Frequency of administration |
|--|---|-----------------|---|---|--|---|--|-------------------------------|
| Lauzon et al. (2004) ³⁶ . CFQ; | Fusion (inability to consider thoughts as only thoughts). | 7 | Seven-point scale; “never true” (1) to “always true” (7). | Higher scores indicate higher levels of cognitive fusion. | “I struggle with my thoughts”. | TR; $r = .80$ IC; $\alpha = 0.79$ (Solé et al., 2015). | Good validity (construct and incremental), temporal stability (Gillanders et al., 2014). | Pre, mid, post and follow-up. |
| ELS; Trompetter et al. (2013) | Assessing valued living, the scale is comprised of two subscales; valued living (10 items) and life | 16 | Five-point scale; “completely disagree” (1) to | Higher scores indicate living in accordance with values. | “I make choices based on my values even if it is stressful”. | IC; $\alpha = .86 - .90$ | Good construct validity (Trompetter et al., 2013). | Pre, mid, post and follow-up. |

³⁶ This scale is based on the Eating Inventory (Stunkard & Messick, 1985) but utilises a modern scaling. As this scale only targets emotional eating in response to negative emotions, three items focusing on eating in response to positive emotions were generated based on the literature and administered to participants along with the three items from this scale. See section 2.3.4 in extended paper for additional information regarding the development of these items.

Table 5. *Continued**Description of self-report measures*

| Name of measure & author | Aim | Number of items | Item scaling & Anchor points | Directionality | Example item | Reliability | Validity | Frequency of administration |
|----------------------------------|--|-----------------|--|---|---|---|---|-------------------------------|
| | fulfilment (6 items). | | "completely agree" (5). | | | | | |
| MAAS; Brown & Ryan (2003). | Mindfulness across a range of domains including cognitive, emotional, physical, and interpersonal. | 15 | Six-point scale; "almost always" (1) to "almost never" (6) | Higher scores reflect more mindfulness. | "It seems I am "running on automatic" without much awareness of what I'm doing".* | IC; $\alpha = .87$ TR; $r = .81$ (Brown & Ryan, 2003) | Strong convergent, discriminant, and incremental validity (Brown & Ryan, 2003). | Pre, mid, post and follow-up. |

Table 5. *Continued**Description of self-report measures*

| Name of measure & author | Aim | Number of items | Item scaling & Anchor points | Directionality | Example item | Reliability | Validity | Frequency of administration |
|---|--|------------------------|--|---|--|--|---|------------------------------------|
| PHLMS; Acceptance subscale Cardaciotto, Herbert, Forman, Moitra & Farrow (2008). | Psychological acceptance (a key component of mindfulness). | 20 | Five point scale; “never” (1) to “very often” (5). | Higher scores indicate more acceptance. | “I try to stay busy to keep thoughts or feelings from coming to mind”* | IC; $\alpha = .81 - .85$ (Cardaciotto et al., 2008). | Adequate validity (convergent and discriminant) (Cardaciotto et al., 2008). | Pre, mid, post and follow-up. |

Note: PHLMS: Philadelphia Mindfulness Scale; CFQ: Cognitive Fusion Questionnaire; MAAS: Mindful Attention Awareness Scale; ELS: Engaged Living Scale; TFEQ: The Three Factor Eating Questionnaire; EI: Eating Inventory; * item is reverse scored. IC: Internal Consistency; TR: Test retest Reliability. CV: Convergent Validity. DV: Discriminant Validity. Please note that three items were taken from the PHLMS, CFQ, MAAS, and ELS in designing the bespoke daily ACT measure.

Change interview. Post-intervention, a change interview³⁷ (guided by Elliott et al., 2001) was conducted by an independent interviewer to limit the potential risk of biased responses (questions outlined in Table 6). The purpose of the change interview was to assess whether the participant believed any changes occurred as a result of their engagement in the ACT intervention, and to highlight contextual information which may have contributed to the changes experienced.

Table 6.

Change interview questions

| Questions posed to participants post-intervention |
|--|
| 1. Can you please tell me how you found the intervention? |
| 2. Did the book make sense? |
| 3. Would you recommend this book to others? |
| 4. Were there any parts of the book which you found helpful/not helpful? |
| 5. What would you say has changed for you? |
| 6. In your opinion were these changes positive or negative? |
| 7. Can you rate how surprised you were by these changes on the following five point scale from 1 (not surprised by the changes) to 5 (surprised by the changes)? |
| 8. Please rate how likely it is that these changes were a result of the intervention from 1 (not likely) to 5 (likely)? |
| 9. Rate the importance of these changes on a five point scale from 1 (not important) to 5 (important)? |
| 10. Did any external events occur during the study time period? (e.g., in the areas of work or relationships). If so, do you think this may have had an effect? |
| 11. Can you tell me how you found the researcher? |
| 12. Any additional comments? |

³⁷ See section 2.3.1.0 for additional information on the change interview.

Procedure³⁸

Ethics. This study was approved by the University of Lincoln, School of Psychology Research Ethics Committee (SOPREC)³⁹. In brief, participants provided informed consent, were made aware that telephone calls would be recorded, and were paid for their involvement in the study⁴⁰.

Recruitment⁴¹. Participants were recruited through poster advertisements, email circulation, and online message boards. Potential participants who expressed an interest in the study were emailed a copy of the information sheet and asked to complete a screening tool to determine eligibility. Eligible participants were invited to an initial meeting to assess BMI and find out more about the study. See figure 2 for an outline of the procedure.

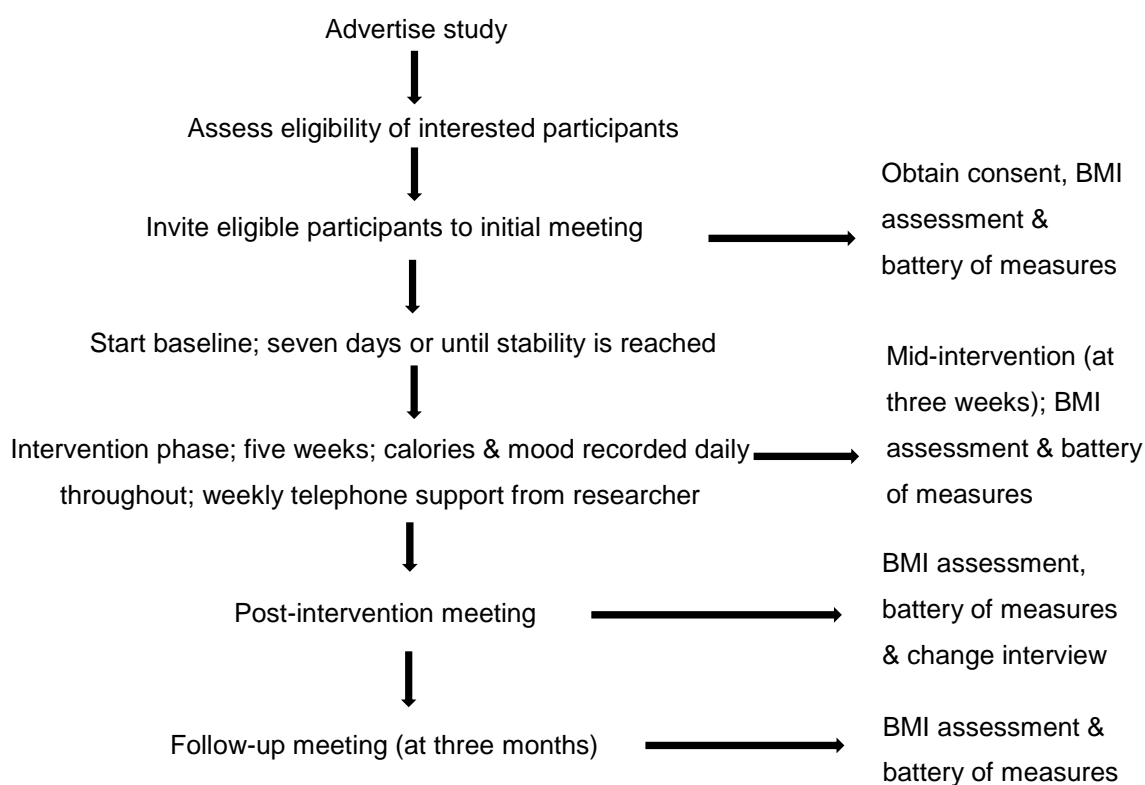


Figure 2. Flow chart of procedure

³⁸ See 2.4 in the extended paper for additional information relating to the procedure.

³⁹ See 2.5 in the extended paper for further details on ethical considerations.

⁴⁰ £50 for participation in the intervention phase and an additional £10 for engagement in the follow-up.

⁴¹ See 2.4.1 in the extended paper for further details regarding recruitment.

Baseline. The researcher met with each participant to answer their questions before obtaining informed written consent⁴². Participants then completed the self-report battery of measures and commenced the baseline phase, which consisted of daily completion of the brief ACT measure until stability was achieved (i.e., a stable or deteriorating trend in the last three data points; Kratochwill et al., 2010)⁴³. The baseline phase for participants ranged from 7 to 17 days.

Intervention and follow-up. Participants were provided with a copy of an ACT self-help book specific to weight management entitled “The Diet Trap” (Lillis et al., 2014). Participants were guided to read specific chapters each week over a five week period (Table 7)⁴⁴, whilst completing the daily measures online. To help with intervention adherence and check understanding, the researcher telephoned participants on a weekly basis (Plumb & Vildargo, 2010). The average length of telephone calls was ten minutes. As can be seen in figure 2, at mid, post, and follow-up, participants met with the researcher at the University, or an alternative appropriate venue, to complete the self-report measures and assess BMI. On completion of the intervention, participants completed a change interview.

⁴² See 2.5.1 in the extended paper for further information on obtaining informed consent.

⁴³ See 2.4.2 in the extended paper for more details relating to baseline stability.

⁴⁴ See 2.4.3 in the extended paper for additional information relating to the rationale for selection of this particular intervention. See 2.4.4 for details relating to a comparative analysis which informed the selection of this intervention.

Table 7.

Chapters and content from “The Diet Trap” (Lillis et al., 2014)

| Week | Chapters | Summary of content | ACT components |
|------|----------|--|---|
| 1 | 1 | Introduction to ACT, emotions, thought suppression, control as the problem, covers the myths associated with dieting and emotional eating. | <ul style="list-style-type: none"> • None, although acceptance is the closest |
| | 2 | Self-compassionate weight loss. | <ul style="list-style-type: none"> • Present moment awareness; self-as-context |
| 2 | 3 | Defusion, stream of thoughts, present moment awareness of thoughts. | <ul style="list-style-type: none"> • Defusion; present moment awareness |
| 3 | 4 | Looks at emotional eating in response to positive and negative emotions, acceptance/willingness- choosing healthy living even when it is hard. | <ul style="list-style-type: none"> • acceptance; present moment awareness |
| 4 | 5 | Using values to build healthy habits, values and committed action. | <ul style="list-style-type: none"> • Values; committed action; present moment awareness; acceptance; self-as-context |
| 5 | 6 | Putting skills together; recommends revisiting earlier chapters if needed | <ul style="list-style-type: none"> • All processes |
| | 7 | Weight loss knowledge | <ul style="list-style-type: none"> • No component explicitly covered |

Analysis⁴⁵

In line with guidance from the What Works Clearinghouse (Kratochwill et al., 2010), the effectiveness of the ACT intervention was assessed via the following seven methods⁴⁶.

1. Comparing scores on the screening measure across stages (pre, mid, post, follow-up) to explore whether participants still meet the criteria as “emotional eaters”.

2. A visual analysis of the graphical display of the relationship between calorie intake and mood and change over time (Barlow & Hersen, 1984; Morley & Adams, 1991).

3. To strengthen the visual analysis, calorie intake and positive and negative mood were analysed using Simulation Modelling Analysis (SMA; Borckardt et al., 2008) to assess the impact of the intervention on the relationship between these variables. SMA is a bootstrapping method which explores the correlation between two variables adjusting for autocorrelation within each phase (e.g., what is the association between calories and mood in the baseline/intervention phase after adjusting for autocorrelation?)⁴⁷.

4. Calculation of the reliable change index (RCI) and clinically significant change (CSC)⁴⁸ to determine whether the magnitude of change on pre to mid, post and follow-up self-report questionnaires were deemed reliable and clinically significant (Jacobson & Truax, 1991; Evans, Margison & Barkham, 1998). Employing RCI and CSC criteria allows participants to be classified into one of the following outcomes post-intervention; “recovered” (improvement that achieves both RCI and CSC criteria); “improved” (improvement that achieves RCI but not CSC criteria); “no change” (change is within the expected range), or

⁴⁵ Please note; methods of analysis one to six informed research question one; methods of analysis four and five were used to inform research question two, and methods of analysis four, five and six were used to inform research question three. See 2.6 in the extended paper for additional analysis information.

⁴⁶ Please note that prioritisation will be given to scores which are divergent.

⁴⁷ The data were checked against assumptions prior to proceeding with analyses, for example, short data stream (<30 observations in one phase) and equally spaced (daily intervals).

⁴⁸ See 2.6.1 in the extended paper for clarification on the concepts of RCI and CSC.

“deteriorated” (deterioration that achieves RCI criteria but not CSC, or both) (Davies & Sheldon, 2011; Jacobson, Roberts, Berns & McGlinchey, 1999)⁴⁹.

5. Changes in weight were compared across stages (pre, mid, post, and follow-up).

6. Informed by a Hermeneutic Single Case Experimental Design (HSCED; Elliott, 2002), qualitative data from the change interviews were transcribed and tabulated, and salient themes and commonalities were extracted to support data analysis and inform context⁵⁰. The qualitative data were also integrated as a means of triangulation according to recommendations by Fetters, Curry, and Creswell (2013).

7. A subset of the telephone check-in calls were recorded and a sub-set of these were checked for treatment fidelity (guided by Plumb & Vilardago, 2010) by two independent raters⁵¹.

⁴⁹ These terms have been adopted in the results section.

⁵⁰ See Table 10.

⁵¹ See 2.6.2 in the extended paper for an overview on the treatment fidelity check.

Results⁵²

The three research questions focused on whether (a) the outcome of emotional eating, and weight, changed; (b) the ACT processes changed, and (c) if any changes in the ACT processes may have been related to changes in emotional eating. Below the results have been framed according to these questions.

Research Question One: Did Outcome Change?

To examine this, we drew on five sources of evidence; emotional eating screening and self-report measures, the association between calorie intake and mood; change interviews and changes in weight. A summary of the findings are described below.

Emotional eating screening measure. Table 8 presents participant scores on the Internal Disinhibition subscale of the Eating Inventory (which gauges emotional eating) across the study period. As illustrated in Table 8, there were reduced scores at follow-up for four participants (P3, P4, P5, and P6), three of which fell below the clinical cut-off score of five (P3, P4, and P6). There were no reductions in emotional eating for the remaining two participants (P1 and P2).

Table 8.

Participant scores on the Internal Disinhibition subscale

| Participant | Pre | Mid | Post | Follow-up |
|-------------|-----|-----|------|-----------|
| 1 | 8 | 8 | 8 | NA |
| 2 | 8 | 8 | 8 | 8 |
| 3 | 7 | 3 | 7 | 1 |
| 4 | 8 | 5 | 1 | 0 |
| 5 | 7 | 8 | 8 | 6 |
| 6 | 7 | NA | 3 | 2 |

⁵² See 3.1 in the extended paper for additional demographic information.

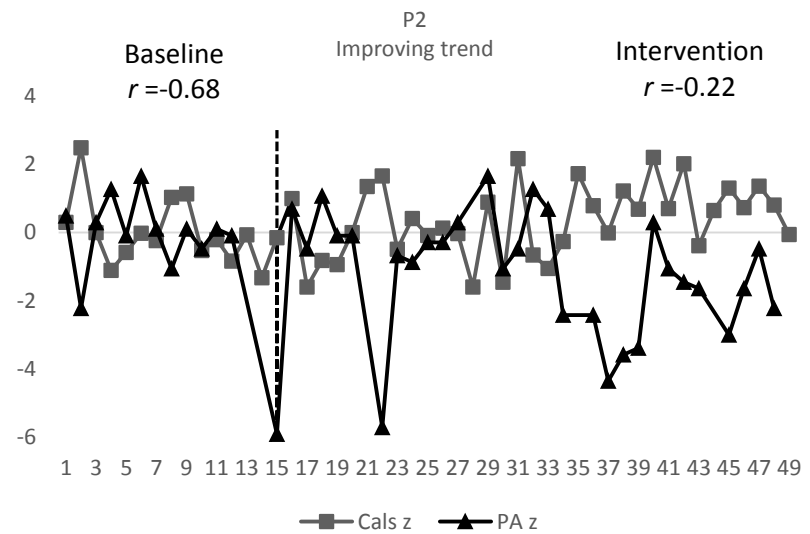
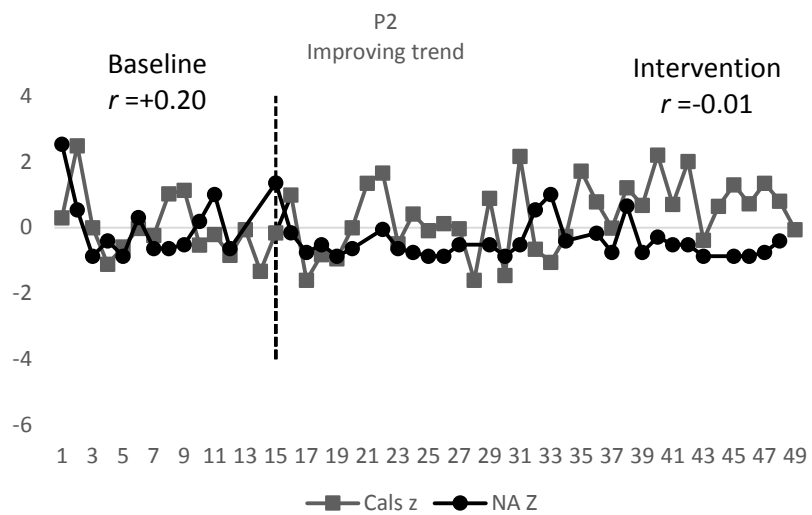
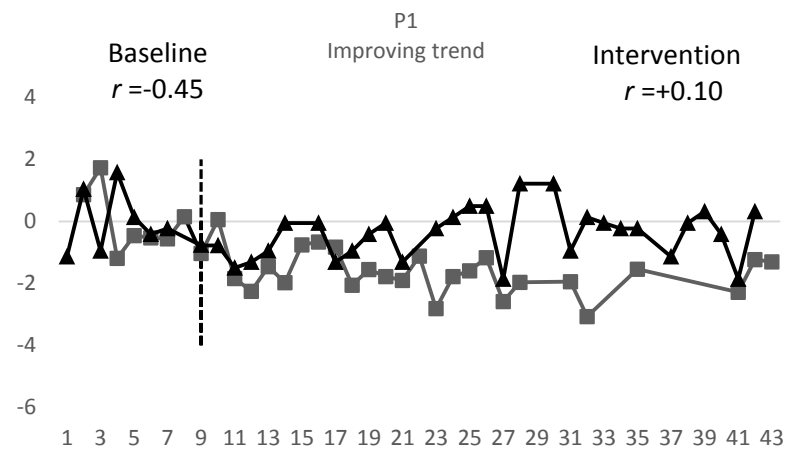
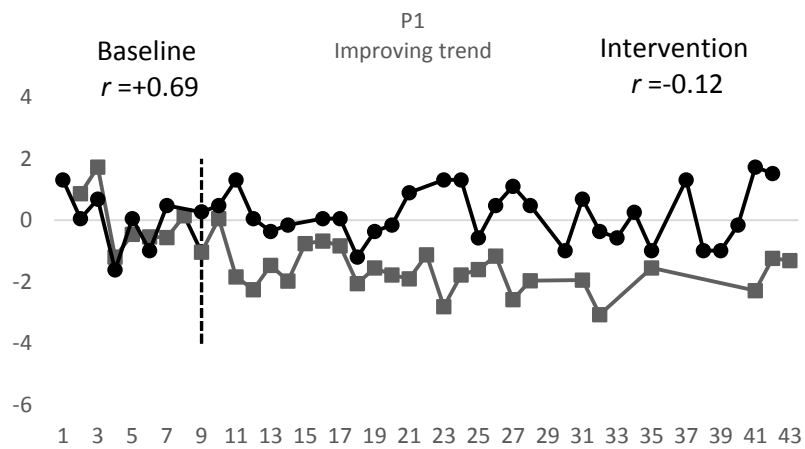
Emotions and calorie information⁵³. Participant scores on the daily records of calorie intake⁵⁴ and emotions (positive and negative) are displayed in Figure 3. To aid interpretation, the daily ratings were standardised into z scores allowing the presentation of both variables on the same metric (Field, 2013). It is important to note that initially five participants (P1, P2, P3, P4, and P5) identified negative emotions as having an influential effect on their eating behaviour, whereas only one participant (P6) reported that she tended to overeat in response to both positive and negative emotions. These initial differences may explain the variability in responses.

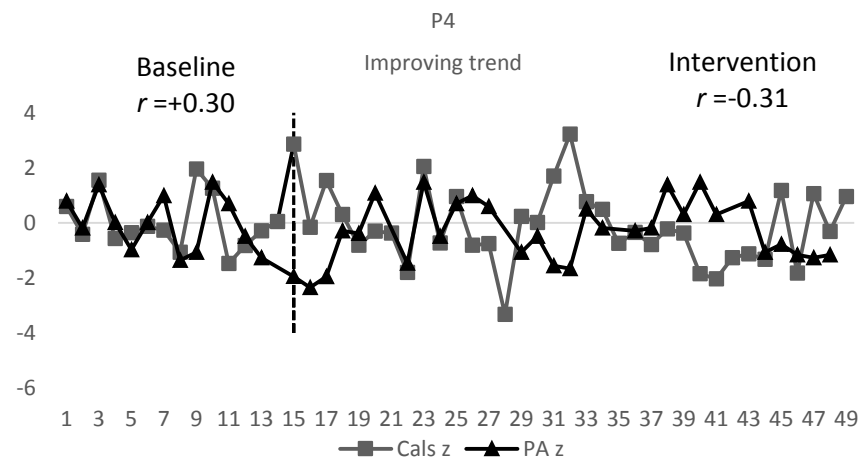
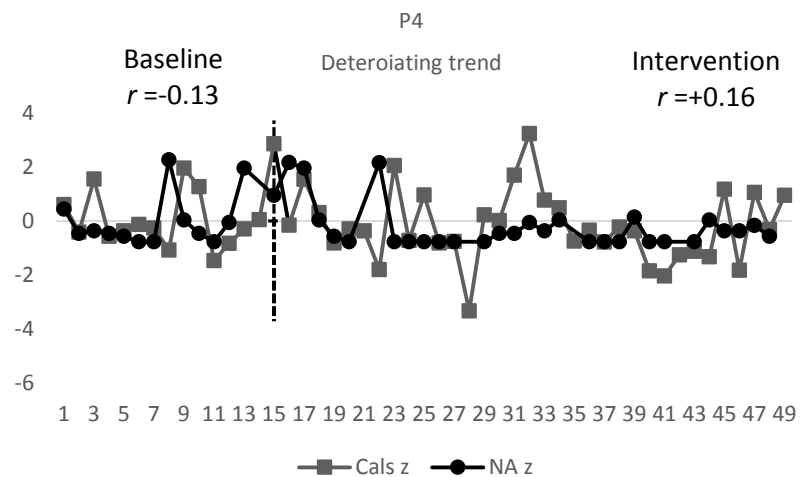
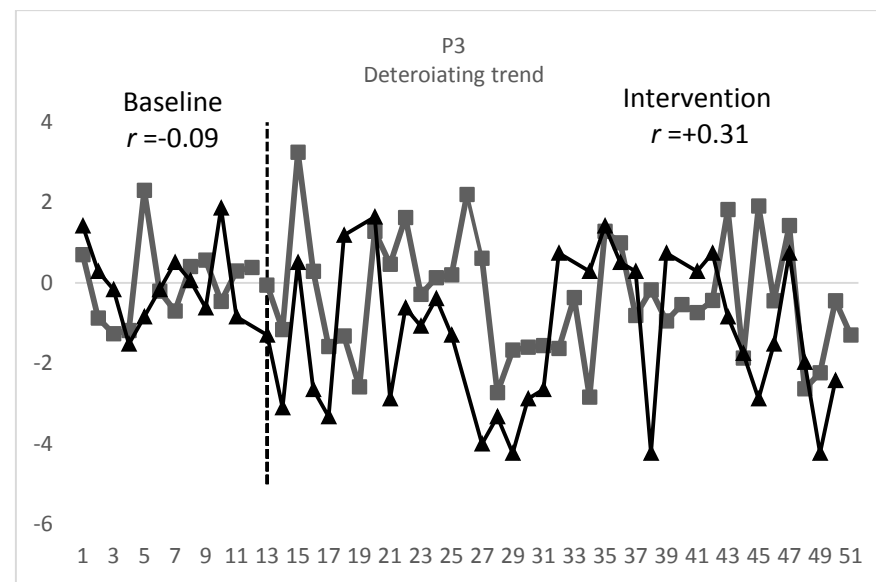
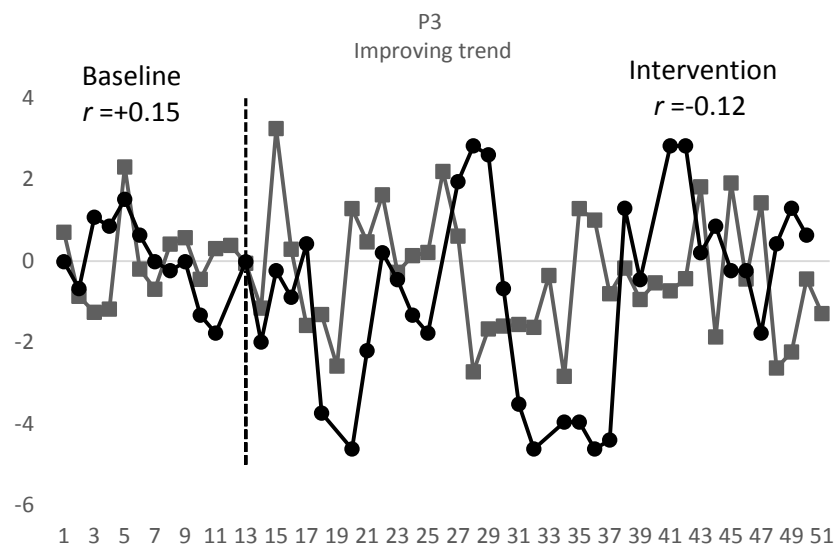
The graphical plots were visually inspected to assess whether eating was contingent on positive or negative emotions in the intervention phase. Changes from baseline to the intervention phase were explored in order to assess whether the introduction of the intervention resulted in reduced calorie intake regardless of the type of emotion experienced. This analysis revealed that the baseline and intervention scores on these daily ratings were predominantly variable with peaks and troughs occurring at similar time points for both.

A SMA was conducted to examine the difference in the relationship between eating and mood across the two phases. The correlation coefficient information is presented in each graph in Figure 3. Participants were classed as having an “improving trend” when their individual pattern indicated that eating was not contingent on that particular type of mood relative to baseline and where there was an association between calorie intake and mood, and as having a “deteriorating trend” when there was no evidence of the impact of the intervention on the variables in question, or there was an increase in the correlation coefficient in the intervention phase relative to baseline. Outcomes of the SMA revealed variability in the relationships between calorie intake and positive and negative mood both within and across participants.

⁵³ See 3.2 in the extended paper for further details about z score transformation.

⁵⁴ Please note that calorie intake was based on calories consumed minus any calories burned through physical activity.





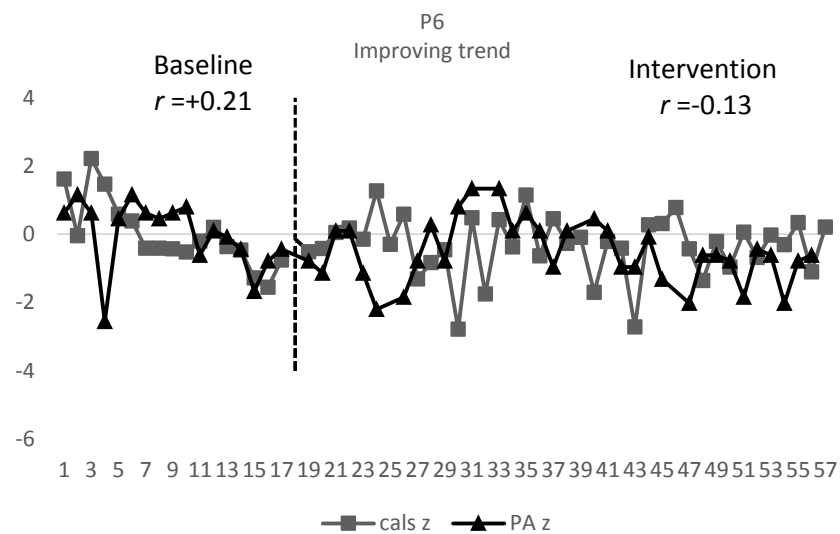
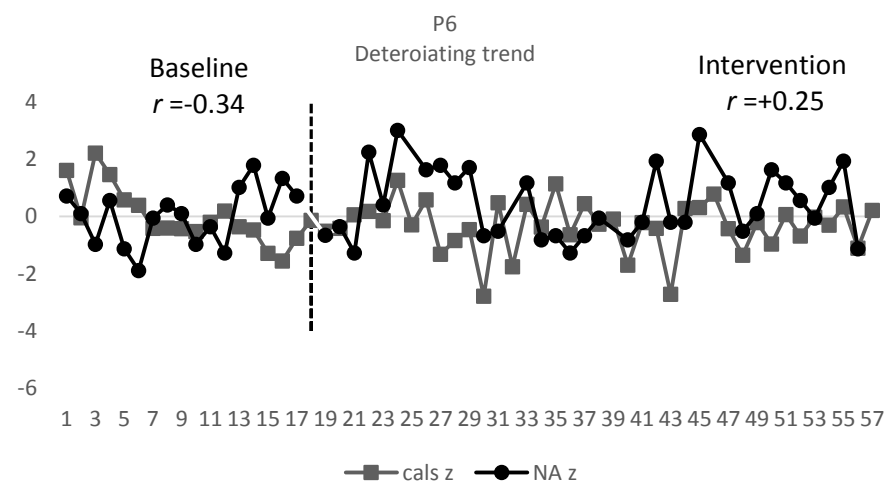
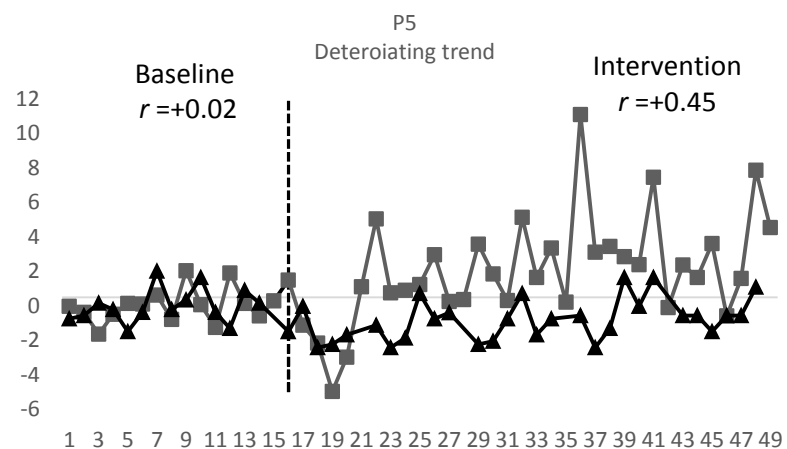
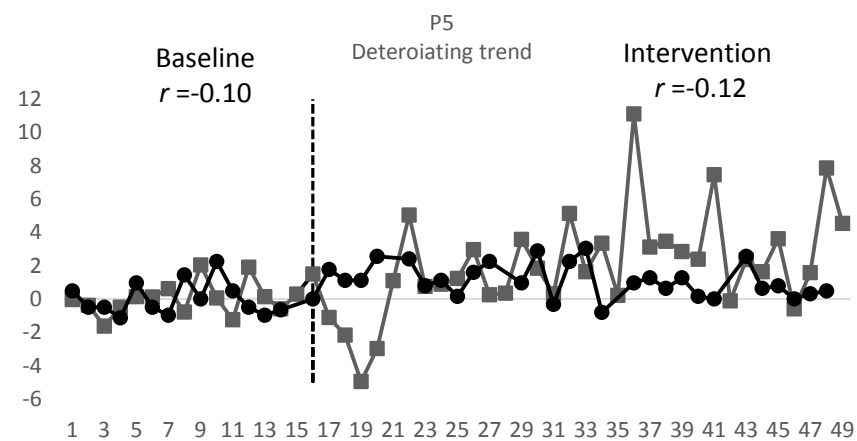


Figure 2. Graphs representing daily calorie intake and mood

Self-report measure of emotional eating⁵⁵. Table 9 contains participants' pre, mid, post, and follow-up scores on the emotional eating measure in response to positive and negative emotions, and weight. As five of the six follow-ups occurred, missing data only exists for one participant (P1). On the emotional eating in response to negative emotions measure, RCI demonstrated reliable change in both directions for four participants (P1, P2, P3, and P5), although none of these reached CSC. Post-intervention, two participants (P4 and P6) achieved reliable and clinically significant change on emotional eating in response to negative emotions and were deemed to have "recovered"; these changes were maintained at follow-up. On the emotional eating in response to positive emotions measure, no clinically significant improvements were observed, although two participants (P4 and P6) reliably "improved" and two reliably "deteriorated" (P3 and P5).

Changes in weight. Four participants lost weight post-intervention (P3, P4, P5, and P6), three of which (P3, P5, and P6) maintained this weight loss, and had a further slight decrease in weight at the three month follow-up. Two participants (P1 and P2) gained weight from pre to post intervention. One of these participant's (P2) weight fluctuated over the course of the study with an observed decrease in weight from pre to mid intervention.

Change interviews. Table 10 presents a summary of the most salient information from the change interviews which all six participants engaged in. Despite the inconsistency across the self-report measures, all participants considered the intervention helpful, with some reporting that it reduced emotional eating and made them more aware of their eating patterns.

⁵⁵ See 3.3 in the extended paper for reference norms used. See 3.4 for the results on the implicit measure.

Research Question Two: Did the Processes Change?⁵⁶

To answer this question, we drew on two sources of data, self-report ACT-specific measures and the change interviews. Table 9 contains participants' scores on the CFQ, PHLMS, MAAS, and ELS. All participants were deemed to have “recovered” on at least one ACT process measure.

On the CFQ assessing fusion, four participants (P2, P3, P4, and P6) achieved reliable and clinically significant change and were deemed to have “recovered” at follow-up, with one participant (P6) also demonstrating CSC at mid and post intervention.

On the PHLMS Acceptance subscale, two participants (P4 and P6) showed clinically significant improvements at different phases, whilst one participant (P2) “deteriorated” at mid-intervention. However, the latter deterioration was not maintained post-intervention.

On the MAAS assessing mindfulness, four participants (P1, P2, P4, and P6) showed reliable and CSC at different phases. More specifically, two participants “recovered”; one (P1) post-intervention and the other (P2) at the follow-up stage. Meanwhile, one participant (P4) “improved” but did not achieve a CSC and another participant (P6) reliably “improved” at mid-intervention, and “recovered” at post and follow-up phases.

On the ELS assessing values, four participants (P3, P4, P5, and P6) “recovered” at the follow-up phase, two of which (P4 and P6) also demonstrated CSC post-intervention.

Change interviews. As noted in Table 10, all participants indicated finding at least one ACT process helpful. The ACT processes cited as particularly important by participants included acceptance, mindfulness, and values.

⁵⁶ As noted earlier, although not the focus of the journal paper, a daily ACT measure was also administered. See 3.5 in the extended paper for trend, level and stability information of this daily ACT measure over the study period.

Table 9.

Pre, mid, post and follow-up scores for all participants

| Participant | Time | CFQ | PHLMS | MAAS | ELS | EE Neg | EE Pos | Weight (kg) |
|-------------|------|------------------------|------------------------|-----------------------|------------------------|-----------------------|-------------------|-------------|
| 1 | Pre | 45.0 | 16.0 | 3.6 | 33.0 | 4.0 | 1.3 | 101.4 |
| | Mid | 45.0 | 16.0 | 3.9 | 30.0 | 4.0 | 1.0 | 103.8 |
| | Post | 49.0 | 17.0 | 4.4 ^{R↑, C↑} | 32.0 | 2.7 ^{R↑} | 1.0 | 104.6 |
| | FU | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Pre | 34.0 | 33.0 | 3.9 | 51.0 | 3.3 | 3.0 | 90.2 |
| | Mid | 36.0 | 23.0 ^{R↓} | 3.9 | 53.0 | 4.0 ^{R↓} | 3.0 | 89.6 |
| | Post | 31.0 | 26.0 | 4.0 | 57.0 | 3.7 | 3.3 | 92.8 |
| | FU | 22.0 ^{R↑, C↑} | 28.0 | 4.7 ^{R↑, C↑} | 48.0 | 4.0 ^{R↓} | 4.0 | 96.7 |
| 3 | Pre | 39.0 | 29.0 | 3.1 | 48.0 | 4.0 | 1.3 | 97.4 |
| | Mid | 33.0 | 25.0 | 3.4 | 54.0 | 2.3 ^{R↑} | 1.3 | 95.4 |
| | Post | 45.0 | 29.0 | 3.1 | 33.0 ^{R↓} | 4.0 | 1.0 | 96.2 |
| | FU | 20.0 ^{R↑, C↑} | 30.0 | 3.5 | 63.0 ^{R↑, C↑} | 2.3 ^{R↑} | 2.3 ^{R↓} | 94.8 |
| 4 | Pre | 28.0 | 20.0 | 2.5 | 50.0 | 3.7 | 2.3 | 76.0 |
| | Mid | 21.0 | 24.0 | 3.7 ^{R↑} | 58.0 | 2.7 ^{R↑} | 1.0 ^{R↑} | 75.4 |
| | Post | 21.0 | 28.0 ^{R↑} | 4.1 ^{R↑} | 64.0 ^{R↑, C↑} | 1.0 ^{R↑, C↑} | 1.0 ^{R↑} | 72.6 |
| | FU | 18.0 ^{R↑, C↑} | 33.0 ^{R↑, C↑} | 3.9 ^{R↑} | 64.0 ^{R↑, C↑} | 1.3 ^{R↑, C↑} | 1.7 | 76.6 |
| 5 | Pre | 19.0 | 37.0 | 2.0 | 66.0 | 3.0 | 2.3 | 93.2 |
| | Mid | 24.0 | 32.0 | 2.5 | 63.0 | 4.0 ^{R↓} | 2.7 | 91.6 |
| | Post | 26.0 | 31.0 | 2.7 | 64.0 | 4.0 ^{R↓} | 4.0 ^{R↓} | 92.4 |
| | FU | 16.0 | 37.0 | 2.6 | 79.0 ^{R↑, C↑} | 3.7 ^{R↓} | 3.0 | 91.6 |
| 6 | Pre | 41.0 | 15.0 | 2.5 | 55.0 | 2.3 | 4.0 | 80.0 |
| | Mid | 21.0 ^{R↑, C↑} | 36.0 ^{R↑, C↑} | 3.8 ^{R↑} | 62.0 | 1.7 ^{R↑, C↑} | 3.7 | 79.4 |

Table 9.
Continued

| Participant | Time | CFQ | PHLMS | MAAS | ELS | EE Neg | EE Pos | Weight (kg) |
|-------------|------|------------------------|------------------------|-----------------------|------------------------|-----------------------|-------------------|-------------|
| | Post | 25.0 ^{R↑, C↑} | 33.0 ^{R↑, C↑} | 4.5 ^{R↑, C↑} | 70.0 ^{R↑, C↑} | 2.0 | 2.7 ^{R↑} | 79.2 |
| | FU | 24.0 ^{R↑, C↑} | 32.0 ^{R↑, C↑} | 4.5 ^{R↑, C↑} | 67.0 ^{R↑, C↑} | 1.7 ^{R↑, C↑} | 2.3 ^{R↑} | 77.5 |

Note. CFQ: Cognitive Fusion Questionnaire; PHLMS Accept: Philadelphia Mindfulness Scale Acceptance subscale; MAAS: Mindful Attention

Awareness Scale; ELS: Enhanced Living Scale; EE Negative: Emotional Eating (in response to negative emotions); EE Positive: Emotional Eating (in response to positive emotions); Weight: Weight in kilograms; ^R denotes Reliable Change at $p < .05$; ^C denotes Clinically Significant Change (from clinical to non-clinical range); ^{↓/↑} indicates directionality of Reliable or Clinically Significant Changes; [↓] indicates deterioration away from the desired direction of change; [↑] indicates improvement in the direction of desired change. Cannot have CSC unless RCI is reached (Jacobson & Truax 1991). For measures whereby high scores equal deterioration, for CSC a reduced score is required from pre to post, and the post score must be lower than the CSC score. This applied to the CFQ and EE measures. For the remaining measures where higher scores indicate an improvement, an increase in scores from pre to post is required, whereby the post score must be higher than the cut-off score for CSC. N/A: missing data.

Research Question Three: Did Outcome Link to Process?⁵⁷

Evidence used to answer this question included consideration of context (external events), determining if any changes in ACT processes preceded changes in emotional eating, and participants' ratings of the intervention.

Evidence of mediation (changes in ACT processes prior to, or alongside, outcome). In terms of temporal precedence, in three cases (P1, P4, and P6) where there were reductions in emotional eating, all had a concurrent or a preceding change in the MAAS (gauging present moment awareness). Furthermore, this occurred with changes on the CFQ, PHLMS Acceptance subscale and ELS for two participants (P4 and P6). This is indicative of mediation (i.e., change may be attributed to the ACT intervention). However, for one participant (P2) who changed on the MAAS in a positive direction post-intervention, an increase was observed in her emotional eating scores prior to that and at around a similar time period. This pattern would be contra indicative of mediation.

There was minimal evidence that the process of acceptance linked to emotional eating; when there was a decrease in acceptance, there was a concurrent deterioration in emotional eating for two participants (P2 and P5). In addition, for two participants (P4 and P6) where acceptance improved, there was also a concurrent or preceding improvement in emotional eating. However, there were also two cases (P1 and P3) when emotional eating improved without any changes in acceptance, which questions whether these findings may be more spontaneous than hypothesised.

Change interviews. All participants reported finding the ACT processes helpful and considered the intervention responsible for change. However, a number of external events occurred during the study time period which may have negated the effects of the intervention or contributed to some of the changes experienced (please refer to Table 10).

⁵⁷ See 3.6 in the extended paper for a summary of changes for and against each research question.

Table 10

Summary of information from change interviews for all participants.

| Question | P1 | P2 | P3 | P4 | P5 | P6 |
|-----------------------------|--|--|---|---|---|--|
| Opinion on the intervention | Helpful; but too brief. | Helpful | Helpful | Helpful | Helpful | Helpful |
| Did the book make sense | Understood the book, well written, simply laid out. | Understood the book - the language was clear and easy to understand. | Understood the book, found it easy to read, and made sense. | Understood the book, found it easy to read, and could relate to it. Found some of the analogies used patronising. | Understood the book, but found some of the analogies used patronising. Did not engage in some of the exercises (lack of interest/time). | Understood the book, found some parts repetitive. |
| Recommend the book | Yes, already recommended to friends. | Yes. | Yes, already recommended to friends. | Yes, already recommended to sister. | Yes. | Yes, already recommended to mother. |
| Most helpful aspects | Values and liked how the past was linked with the present. Found the whole book helpful. | Values and liked how the past was linked with the present. | Values; found the whole book helpful. | Mindfulness, acceptance. | Values, self-monitoring, and the process of taking part in the study; liked how the past was linked with the present; found the whole book helpful. | Mindfulness, acceptance; chapter on "weight loss know how" helpful; and the visualising exercises. |

Table 10. *Continued**Summary of information from change interviews for all participants.*

| Question | P1 | P2 | P3 | P4 | P5 | P6 |
|---|--|---|--|--|--|--|
| Least helpful aspect | Found the book contradictory by suggesting that one should not follow rules/diets but then included a weight loss summary guide. | Did not like the epitaph (i.e., exercise relating to values). | N/A, made no explicit comment about what they did not like or found least helpful. | N/A, made no explicit comment about what they did not like or found least helpful. | N/A, made no explicit comment about what they did not like or found least helpful. | N/A, made no explicit comment about what they did not like or found least helpful. |
| Changes experienced | A change in outlook; clarification of values; increase in self-awareness, acceptance and a reduction in emotional eating and avoidance; not feeling guilty after eating. | A change in outlook; clarification of values; reported an increase in self-awareness and food intake. | A change in outlook; clarification of values. | A change in outlook; clarification of values; a reduction in emotional eating. | An increase in self-awareness when eating. | A change in outlook; clarification of values, an increase in acceptance; less self-critical about her clothes size; and feeling good about self. |
| Changes classed as positive or negative | Positive | Positive | Positive | Positive | Positive | Positive |

Table 10. *Continued**Summary of information from change interviews for all participants.*

| Question | P1 | P2 | P3 | P4 | P5 | P6 |
|---|---|---|-------------------|--|---|---|
| How surprised by the changes from 1 (not surprised) to 5 (surprised)? | 5 | 4 | 4 | 4 | 4 | 4 |
| How likely the changes were a result of the intervention from 1 (not likely) to 5 (likely)? | 4 | 5 | 4 | 5 | 4 | 4 |
| The importance of the changes from 1 (not important) to 5 (important)? | 5 | 5 | 5 | 5 | 4 | 3 |
| External events during the study period | Preparation for Christmas (reported finding it stressful); family problems; relationship breakup; car broke down. | Christmas time; university assignments, and demands in life (e.g., work and family) | Physically unwell | Reported that external events were an opportunity to test learned skills but did not comment on specific events. | Transition to parenthood, and returned to work from maternity leave (consequently less active as driving more); physically unwell; work/family demands. | Went on holiday (disrupted routine); university assignments, family problems; pressure of attending family events |

Table 10. *Continued**Summary of information from change interviews for all participants.*

| Question | P1 | P2 | P3 | P4 | P5 | P6 |
|--|--|---|--|--|---|--|
| Possible competing explanations/external events that may have negated the effects of the intervention* | Physically unwell and experienced a relationship break-up. Went on holiday which may have disrupted typical eating pattern. Experienced family issues and participation coincided with the run up to Christmas. Injured her knee and was unable to exercise. | Participation coincided with Christmas; this festive time of year may be linked with additional eating. Physically unwell in week two. Reported academic and family life pressures. At follow-up, reported health concerns. | Physically unwell. Reported having personal issues in week five. | Reported relying on her partner to cook meals and indicated that these did not adhere to her balanced plan. Experienced a death in the family. | Physically unwell and lost appetite. She was also caring for her child who was unwell too. She reported that her oven broke and she was reliant on takeaway food. Returned to work from maternity leave. Reported being distracted by noise when completing follow-up measures. | Went on holiday which may have disrupted her typical eating pattern. Reported being busy with academic requirements. |
| Opinion of the researcher | Lovely, caring and supportive. Helped motivation as didn't want to let researcher down, researcher's | Fantastic, very supportive and efficient (prompt responding to emails). | Great, encouraging, organised, efficient (sending reminders about questionnaires). | Brilliant, great fun. | Lovely, really helpful, supportive, and efficient (prompt responding to emails and | Lovely, really helpful. Available to provide clarification when needed. |

Table 10. *Continued*

Summary of information from change interviews for all participants.

| Question | P1 | P2 | P3 | P4 | P5 | P6 |
|----------|---|----|----|----|------------------------------------|----|
| | guidance made the process more powerful. Passionate about the study yet participant-focused. | | | | available to answer questions). | |

Note: * This information was collected prospectively on a week by week basis from monitoring contact with participants. Additional information is provided in section 3.7 of the extended paper.

Treatment Fidelity Check⁵⁸

In order to assess the inter-rater reliability of the weekly check-in support for adherence to the ACT model (Plumb & Vilardaga, 2010), 20% of the telephone calls (n = 6) were selected at random and independently assessed by two raters. Each rater assessed whether the researcher (a) checked-in regarding participant's progress; (b) provided advice consistent with the ACT model; and (c) did not provide advice inconsistent with the ACT model (e.g., challenging thoughts). Each component was categorised as 0 ("no presence"), 1 ("partial presence") or 2 ("definite presence"). Due to perfect agreement on "definite presence" across all categories (e.g., Viera & Garrett, 2005), it was unnecessary to conduct coefficient kappa. The high level of agreement is likely to reflect the manifest level of these broad descriptor categories.

⁵⁸ See 3.8 in extended paper for a more detailed description on the treatment fidelity check.

Discussion⁵⁹

The aim of this study was to assess whether a brief guided self-help ACT intervention would help overweight/obese individuals who engaged in emotional eating. It was hypothesised that the intervention would help reduce emotional eating at an individual level and that associated changes in ACT processes would be observed, followed by reductions in weight. This study sought to examine three questions, each of which are considered below in turn with the associated evidence, links to existing research, and followed by a critique of this study.

Research Question One: Did Outcome Change?⁶⁰

This novel ACT self-help intervention produced some clinical improvements in emotional eating in a modest sample. At follow-up, 50% of participants' scores were below the clinical cut-off range on the emotional eating measure which they were initially screened on. Notably, three participants still reached the threshold for emotional eating at follow-up.

All three participants who improved on this valid marker of change lost weight post-intervention. However, only two of these participants maintained the weight loss at follow-up. For the remaining participant who did not demonstrate a corresponding change in weight at follow-up, despite a reduction in emotional eating, it is possible that factors, other than emotional eating, may have contributed to this participant's weight (e.g., time scarcity influencing food choices resulting in the consumption of energy-dense foods; Jabs & Devine, 2006). Indeed, this participant reported that, when busy, her husband cooks resulting in her consuming what she described as "dinners high in carbohydrates".

Regarding the other half of participants who did not change on the primary outcome and still met the criteria as "emotional eaters" at follow-up, two gained weight and one lost weight (however, in the change interview, the latter

⁵⁹ See 4 in the extended paper for a more detailed discussion.

⁶⁰ See 4.1 in the extended paper for a synthesis of the findings relating to the first research question.

participant attributed weight loss to physical illness during the study period). This finding fits with the literature, whereby those who are identified as “emotional eaters” find it harder to lose weight (Neimeier et al., 2007; Butryn et al., 2011; Lillis et al., 2015; Wing & Phelan, 2005). Notably, the intervention was not focused primarily on changing weight given the ACT ethos that such an outcome may be secondary (Hayes, 2004; Harris, 2009) and such secondary changes may be less likely as the study was conducted over a brief time period.

Although it is unclear whether one can statistically define what is considered clinically meaningful, analyses of reliable and clinically significant change is a well reputed method (Jacobson & Truax, 1991). Post-intervention, improvements were found on measures assessing emotional eating for four participants which were considered statistically reliable; and at follow-up, three participants reliably improved. Two participants additionally showed reductions in emotional eating, though not clinically significant.

Across the sample, the association between calorie intake and mood revealed that the introduction of ACT resulted in changes in the relationship between these variables for some participants. However, on exploration of the comparison between self-reported emotional eating and self-reported calorie intake and mood information, differences were found. For example, there were discrepancies between both types of measures for two participants (P4 and P6). Both participants globally stated that they had mastered their emotional eating, however, on the basis of their day-to-day eating patterns, there was less evidence of such change. It is difficult to determine whether the day-to-day (“experiencing self”), or the self-report data based on recall (“remembering self”) is the most accurate predictor of outcomes (Kahneman & Riis, 2005); though recall may be classed as more important to the individual, however, the day-to-day data may be more indicative of change. The differences may also be explained either by variable completion of the daily records (underestimation of food intake) or recall bias, as the self-report measures were completed retrospectively.

Given that two participants remained symptomatic of emotional eating post-intervention, it is important to consider potential confounding variables. It is apparent that the two non-responders (P2 and P5) had a qualitatively different experience in comparison to responders in terms of the emotional eating

screening and self-report measures. One non-responder (P2) reported that participating in the study over Christmas time interfered with her progress due to it being “a social time for eating”. Therefore, weak outcome may be attributed to circumstances rather than the intervention itself. The other non-responder (P5) reported that she did not complete some of the exercises in the intervention due to “a lack of interest and time constraints”. Arguably, poor engagement/readiness to change may have impacted on outcome (Treasure et al., 1999). Another possibility is that ACT does not reduce emotional eating because it is not targeting the associated processes for some individuals. Alternatively, it is possible that the intervention was effective but moderated by other unhealthy behaviours (e.g., living a sedentary lifestyle) that resulted in weight gain.

Despite differences in the self-report measures, the change interviews revealed that all participants’ reported finding the intervention helpful. However, this information needs to be cautiously interpreted due to the potential for social desirability and acquiescence, as even with an independent interviewer, it is possible that participants may have attempted to resolve any dissonance by finding and reporting benefits when the intervention may not have had much of an impact at all (Festinger, 1957; Harmon-Jones & Mills, 1999), particularly as the objective measures do not support the positive interview responses in some cases.

Current findings are comparable to existing studies, demonstrating that brief acceptance-based approaches positively impact on emotional eating and weight reduction (Niemeier et al., 2012; Lillis et al., 2009). Considering that the intervention here was largely self-directed and brief in nature, such a treatment modality is promising for the target population (Bailer et al., 2004). Although ACT self-help interventions have been considered helpful (Cavanagh et al., 2014), there is limited research on self-help approaches for ACT with emotional eating specifically, and so this study makes a useful contribution to the literature. The treatment modality may also explain why some participants did not benefit from the intervention. Hartmann-Boyce, Johns, Jebb, and Aveyard (2014) have suggested that it is more difficult to bring about clinical change using guided/pure self-help in the area of weight loss, as generally more intensive therapeutic input produces better outcomes.

Furthermore, the present study attempted to overcome a number of issues identified in the SCED by Hill and colleagues (2015) as; (a) emotional eating in response to a range of emotions was considered; (b) rather than asking participants to self-report the frequency of emotional eating binges which may be limited considering the automaticity of the behaviour, a strength of this study was that mood and food intake were recorded as separate entities; (c) this study considered the broader implications of emotional eating on valued living by assessing weight at different time points; (d) the sample size of six participants, although small, increases the generalisability in comparison to two participants, and; (e) this study excluded participants with other psychiatric concerns which may have compromised the previous study's results. Nevertheless, a consistent finding across both studies is that ACT may be beneficial for some individuals in reducing emotional eating to some degree.

Research Question Two: Did the Processes Change?⁶¹

The ACT process variables improved in line with the target outcome of emotional eating for four of the six participants. Generally across ACT measures post-intervention, three participants met the criteria for CSC; and at follow-up, a total of four participants met the criteria for reliable change. For the three participants who no longer met the criteria as “emotional eaters” on the screening measure at follow-up, all “recovered” on at least two ACT process measures. Notably, two of these three participants (P4, P6) reliably improved on all of the ACT processes.

For two cases, there was a reliable, although not a clinical, increase in emotional eating, and positive changes were also observed in the ACT processes. One participant (P2) improved on the CFQ and the MAAS (gauging fusion and present moment awareness), whilst the other participant (P5) reliably improved on the ELS (assessing values).

In line with the ACT model, one participant (P1) reported a willingness to experience unwanted emotions rather than trying to avoid them as she had done previously (Hayes, 2004). Furthermore, some participants reported

⁶¹ See 4.2 in the extended paper for a synthesis of the findings relating to the second research question.

ongoing difficulties but strived to live according to their values (Harris, 2009). These findings complement the ACT perspective which aims to promote psychological flexibility (Hayes, 2004).

Research Question Three: Did Outcome Link to Process?⁶²

The findings of this study are consistent with the theoretical model underpinning ACT (Hayes, 2004). Most notably from an ACT perspective, it is hypothesised that changes in the ACT processes may occur prior to changes in the target variables (Harris, 2009), in this case emotional eating. There may be a hypothesised “threshold” for ACT processes prior to changes in outcome, whereby should participants fail to attain the necessary “process threshold” then outcome may not be clinically demonstrated, despite clinically relevant changes in the processes. If studies lack sufficient scope to obtain this “threshold” then ACT may be rendered ineffective in eliciting clinically significant outcomes, when on the contrary, observations of micro changes indicate that ACT is more clinically effective than outcome measures may suggest.

In this study, a reduction in emotional eating post-intervention was mediated by improvements on the measures assessing present moment awareness, fusion and values, with some evidence for acceptance. Evidence of temporal precedence was observed for two participants (P4 and P6), whereby a consistent pattern of improvements on measures assessing values and present moment awareness were identified prior (at the midpoint) to reliable improvements on the emotional eating measure in response to negative emotions (at post-intervention/follow-up). These were the same two participants who no longer met the criteria as “emotional eaters” when assessed on the priority measure.

Given that a lack of awareness has been correlated with “mindless” eating (Wansink, 2006), it is unsurprising that increases in awareness resulted in changes in eating behaviour. Equally, in relation to values, from an ACT stance, an increase of awareness may break the cycle of emotional eating as

⁶² See 4.3 in the extended paper for a synthesis of the findings relating to the third research question. See 4.4 for a detailed discussion of the relationship between the study findings and previous research.

individuals are more aware of their behaviour and feelings and may be more likely to respond in line with their values (Hayes, 2004). Present moment awareness may have also reduced negative emotions because individuals are less likely to ruminate on negative thoughts when in-tune with the present moment. The findings of increased awareness and clarification of values are congruent with the change interview data. Participants also reported changes in acceptance and fusion in line with changes in emotional eating.

One participant (P2) had a reliable change on present moment awareness at follow-up. This finding is similar to other studies which have found that ACT tends to produce better outcomes at follow-up (Clarke, Kingston, James, Bolderston & Remington, 2014). For two participants (P2 and P5), changes in the ACT processes did not influence emotional eating. However, ACT proponents (Hayes, 2004; Harris, 2009) suggest that ACT processes underlie behaviour and in order to address the target behaviour, the main objective is to increase psychological flexibility rather than symptom reduction. Therefore, the intervention was still successful in this respect. Additionally, it is possible that both participants found ACT helpful in other areas of their life, a hypothesis supported by positive ratings and reports in the change interviews by both participants.

Furthermore, in the present study based on two affirmative cases where changes in the ACT processes at the mid-point resulted in changes in the outcome of emotional eating, it is hypothesised that there may be a delayed effect in terms of an improvement in emotional eating in the future which was not captured in the brief follow-up period. This further supports the hypothesis of “process thresholds” mediating outcomes.

From participants’ perspectives, change was attributed to ACT processes. Reported changes included a new outlook, clarification of values, increased self-awareness, and a reduction in emotional eating. All changes were considered positive and high ratings were provided by participants regarding the importance of such changes. Although this information is subjective, nonetheless, it highlights that participants considered the ACT processes as responsible for changes in outcome.

It is important to acknowledge reactive effects of the research (Elliott, 2002), whereby outcomes may have been influenced by procedural parts of the

study, such as the self-monitoring aspect. Self-monitoring is one of the key components of behavioural approaches to weight management (Baker & Kirschenbaum, 1993; Booth et al., 2014; Lillis & Kendra, 2014; Wing & Phelan, 2005), and, therefore, may have positively shaped eating behaviour and explained weight loss. Indeed, one participant (P5) reported that she found the self-monitoring aspect helpful.

Furthermore, a recent systematic review and meta-analysis of interventions for weight management, conducted by Jinks, Moghaddam, Dawson and Rennoldson (under review), found that ACT yields small effects and weight losses are lower than clinical cut-offs and those achieved by SBT. However, recipients of both ACT and SBT did better in comparison to those who received ACT or SBT alone (Forman et al., 2012; Lillis et al., 2009). Therefore, ACT may produce better outcomes when combined with SBT. Given the variable findings of this present study, it is suggested that combining ACT with SBT for emotional eaters may be the way forward. There is a Randomised Control Trial (RCT) of this nature currently underway (Lillis et al., 2015).

It is also possible that the weekly check-in provided to support participants through the process may have been sufficient in changing participants' behaviours (Messer & Wampold, 2002). In terms of external events, two participants (P1 and P6) went on holiday during the intervention phase which may have influenced mood and eating behaviour. Other external events, due to their nature (e.g., physical illness, relationship breakup), may have influenced eating behaviour and subsequently impacted on the results (Elliott, 2002). However, given that a control group was not used, it is not possible to determine the extent of the role external factors played and whether the changes were a result of the ACT intervention itself, procedural aspects of the study, or non-specific effects (Elliott, 2002; Norcross, 2011; Messer & Wampold, 2002).

Given that the self-help intervention was guided, the importance of alliance factors on clinical outcome should not be overlooked (Orlinsky, Grawe & Parks, 1994), and change may be credited to relational factors. This is in line with Wampold's (2001) suggestion that a large amount of variance from common factors is due to rapport. Participants commented favourably on the

researcher in the change interview which is further evidence of this possible confounding variable.

Critique⁶³

Whilst there is strength in the single case follow-up design, allowing a detailed examination over time, the follow-up period of three months was relatively brief in comparison to guidance, whereby recommended follow-up periods for weight loss range from 24 to 60 months (Glisenti & Stodl, 2012). A longer-term follow-up would have been beneficial to assess whether any improvements were maintained, this may be particularly important considering that one of the challenges of weight loss is the maintenance of weight (Shaw et al., 2005). Second, although temporal precedence (changes in the ACT processes prior to changes in emotional eating) demonstrates that processes are functionally important to outcome, they were hypothesised as an association and not proven as a causal factor (Hayes, Pistorello & Levin, 2012). More research is needed to explore this area in depth, particularly because it is acknowledged that although the use of ACT-specific measures allows examination of change, it is possible that any changes may actually represent participants' socialisation to the ACT model (Sheldon, Clarke & Moghaddam, 2015).

Third, this is an initial SCED looking at emotional eating using a multimodal multiple measure approach and a data-intensive design. This provided the opportunity for triangulation (Webb, Campbell, Schwartz & Sechrest, 1966), capturing important data and reducing the likelihood of overlooking significant information. However, the inclusion of a large number of measures increases the risk of a type one error, whereby a false positive outcome may be found which did not accurately represent the impact of the intervention (Field, 2013). The repeated administration of measures may have also compromised their psychometric properties. However, given the preliminary nature of research focusing on ACT for emotional eating, the wide

⁶³ See 4.5 in the extended paper for a detailed critique of the study not covered here, and for suggested directions for future research. See 4.6 for clinical, theoretical, and scientific implications of this study.

range of measures provided a broad overview of processes and outcomes, which were considered critically, and, therefore, may maximise understanding of the intricacies of ACT as an intervention for this population. This would have been impossible with a fewer measures and a narrow focus.

The inconsistent picture found casts doubt on the effectiveness of the intervention for emotional eating or the reliability of the measures used within this population. Therefore, more investigation is needed to determine why ACT worked for some participants on some measures and not on others; and determine which of these measures is most important in going forward. Arguably, the daily measures of mood and calories may be considered most indicative of change in terms of actual behavioural outcomes. However, these were reliant on self-report, and so future research may benefit from including a Fitbit activity monitor (Yuen, Park & Friedman, 2012) which may be considered a more accurate method of tracking movement and calories consumption.

Fourth, given that the intervention was self-help and completed in participants' own time, it is unknown to what extent participants engaged in the materials. Although engagement was checked with participants, false reporting may have occurred. Similarly, as change interviews were retrospective, the information may have been subject to recall bias, social desirability and contextual factors (Van de Ven & Huber, 1990). However, external events were recorded at the weekly check-in and the impact of contextual factors on outcomes were considered; this prospective means of measurement is considered more robust (Lambert & Shimokawa, 2011). Further limitations of this study relate to the sample itself, all of whom were self-selecting female participants attending university (Moss & von Ranson, 2006). In consideration of the above, the generalisability of the findings to treatment-seeking overweight individuals or those who engage in emotional eating may be limited.

Conclusion⁶⁴

In summary, these results contribute to the evidence-base for ACT, and indicate mixed support for a brief guided self-help ACT intervention for treating emotional eating. Half of the sample improved on the primary outcome of emotional eating, with two of these participants also losing weight and improving on the ACT processes. Although some participants did not change on the primary outcome of emotional eating, they still rated the intervention positively. Furthermore, as attrition in self-help for disordered eating is high, the lack of attrition in this study is positive. Good engagement and high completion rates are added support for considering such an approach in clinical practice, thus increasing treatment options. Considering the low-intensity nature of this intervention and lack of attrition, such an approach may have promising cost-saving implications for clinical services.

However, the inconsistent nature of the findings and the noted limitations means that the results should be considered with caution. Nevertheless, having more information regarding the mechanisms that determine a treatment response is necessary for maximising delivery and improving outcomes (Kazdin, 2007). Therefore, in order to understand the clinical implications, more research is needed to identify the effective components of ACT processes in relation to efficacy before recommendations for practice can be confidently made. It is hoped that this study will serve as a platform for future research.

⁶⁴ See 4.7 in the extended paper for additional information regarding the conclusion See 4.8 for critical reflections relating to the process of conducting this research.

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Extended paper

1. Extended Introduction

1.1 Extended Introduction

The introduction section of the journal article briefly covered information in relation to emotional eating and ACT. In this extended background section, the aforementioned areas have been covered in more detail to allow greater inferences to be drawn and further set the context. The focus of this section also includes information relating to BMI, consequences of poor weight management, self-help interventions, SCED and an implicit measure which was also used in this study, the Implicit Relational Assessment Procedure (IRAP). Finally, further rationale for the study and exploratory sub-aims of the study are highlighted.

1.2 Rationale for Target Journal Choice

Appetite was considered a suitable target journal given the topics investigated here, which are familiar, and may be of interest, to the journal audience. The journal has previously published an array of studies, including those on ACT and weight management (Alberts, Mulken, Smeets & Thewissen, 2010; Forman & Butryn, 2015; Tapper et al., 2009). The impact factor of Appetite is 2.69, and therefore, compares favourably to the median impact factor of 1.465 of clinical psychology journals. This journal is considered an effective means of dissemination, and the present study, given the above points, may be considered suitable for publication by the editors. There is no word limit for empirical articles of this descript, and so the course guidelines have been followed. Due to their length, author guidelines are available from <http://www.elsevier.com/journals/journal-of-contextual-behavioral-science/2212-1447/guide-for-authors>

1.3 BMI and Definition of Obesity

In contrast to other methods of body fat, such as bioelectrical impedance analysis, skin fold thickness, or waist circumference, BMI is the standard classification system used to determine if an individual is overweight or obese. BMI was developed by the World Health Organisation (WHO) in 1993, and it has distinguished cut-offs for normal and overweight ranges. More specifically, overweight is defined as having a BMI of 25 and above and obesity as 30 or

above (Kopelman, 2000). Obesity⁶⁵ is a condition whereby an excessive and accumulated amount of body fat is linked to health problems. It is estimated that 26% of males and 24% of females are obese in the UK (Health and Social Care Information Centre, 2015). The concept of BMI has been criticised on the basis that it is an inaccurate index of body fat and does not account for muscle mass (Ernsberger, 2012). It is noted that BMI is a proxy of body fat and that other factors (fitness, ethnicity) may impact on the relationship. However, BMI is the standard means of assessing weight in clinical settings, is easy to access and is supported by experts (Bray, 2013) and was, therefore, the approach used in this study.

1.4 Consequences of Poor Weight Management

Weight management is difficult with an estimated 95% of individuals who fail with their initial weight loss efforts (Garner & Wooley, 1991). Poor weight management is a cause of great concern due to the associated psychological and physical health complications, decreased life expectancy and financial implications for the health system (Bray, 2013; Reilly & Kelly, 2010; Wyatt, Winters & Dubbert, 2006; Tapper et al., 2009). Although correlation does not equate with causation, poor weight management, particularly obesity, has been linked with reduced quality of life, low self-esteem, depression, and stigmatization (Friedman & Brownell, 1995; Goldschmidt et al., 2010; BeLue, Francis & Colaco, 2009; Hayden-Wade et al., 2005; Puhl & Brownell, 2001). In terms of physical health implications, being overweight or obese may increase the risk of heart disease, type 2 diabetes, high blood pressure, and cancer (August et al., 2008; Janssen, Katzmarzyk & Ross, 2004). Obesity may also increase overall risk of mortality (Berrington de Gonazalez et al., 2010; Flegal, Graubard, Williamson & Gail, 2005; Finkelstein, Fiebelkorn & Wing, 2004). In fact, Obesity ranks as the fifth main causes of deaths worldwide (WHO, 2015). In 2008, 2.8 million people died globally due to being overweight or obese (WHO, 2015). As mentioned, obesity also poses significant healthcare costs. Indirect costs include absenteeism and lost productivity, thus increasing the

⁶⁵ Although it shares characteristics with eating disorders, obesity is not included in the DSM-V (APA, 2013).

financial burden (Seidell, 1995). It was estimated by 2050 that NHS costs associated with obesity will reach ten billion pounds (Butland et al., 2007).

Although the literature linking obesity to health problems is well substantiated, the evidence related to being overweight and subsequently experiencing health problems is less clear. Flegal and colleagues (2005) found that being overweight was not linked to excessive deaths. Furthermore, a reduced quality of life has only been found in individuals with a BMI under 20 or over 30 and not for those with a BMI between 20 and 30 (Ford, Morarty, Zack, Mokdad & Chapman, 2001). Nevertheless, prevention of excessive weight gain is necessary to reduce the risk of diseases (Manson et al., 1990). Moreover, individuals who are overweight are also at an increased risk of gaining additional weight which may place them in the obese range, subsequently narrowing their quality of life and increasing their health risks. Therefore, being overweight or obese may be viewed on a continuum, and so tackling this problem for individuals who are overweight (and not narrowing the focus to obesity) is important as arguably prevention is better than cure (Phelps, Sapia, Nathanson & Nelson, 2000).

However, it is noted that addressing poor weight management is not an easy endeavour as interventions for individuals who are overweight or obese are either underdeveloped or unavailable (Royal College of Physicians, 2013). Recommended interventions for obesity include lifestyle changes, pharmaceuticals or surgery (National Institute of Clinical Excellence, 2014). Such approaches also neglect the associated psychological issues (British Psychological Society (BPS), 2006a). However, reductionist attitudes in terms of eating less and exercising more are not considered helpful, and may serve to exacerbate the problem and the associated distress experienced (Hill, 2007; Van Vlierberghe & Braet, 2007). Risk factors have been identified which increase the likelihood of distress when combined with obesity. Such factors include being female, having a poor body image, disordered eating behaviour and experiencing difficulties losing weight (Adami et al., 1998; Molinari, Ragazzoni & Morosin, 1997). Individuals who are prone to emotionally eat include those who are more susceptible to environmental cues, restrained eaters and those who crave carbohydrates, all of which increase the likelihood of obesity (Faith, Allison & Geliebter, 1997).

1.5 Emotional Eating

Further to serving a survival purpose, eating has also been considered as strongly linked with emotions. Although there are a range of terms for emotional eating in the literature, such as “compulsive eating”, “disordered eating”, or “comfort eating”, the most commonly used term “emotional eating” will be used here (Ganley, 1989). Emotional eating is different from “external eating” whereby eating may be influenced by environmental cues (Van Strien, Van der Zwaluw & Engels, 2010). Instead, emotional eating refers to eating in order to regulate negative emotions, such as boredom, stress, and low mood (Lindeman & Stark, 2001; Tapper, Shaw, Ilesley, & Moore, 2007; Van Strien & Ouwens, 2003), although it is recognised that some individuals may also eat in response to positive emotions (Nolan, Halperin & Geliebter, 2010).

Emotional eating contributes to poor weight management as eating occurs despite the absence of physiological hunger⁶⁶ (Ganley, 1989; Hudson & Williams, 1981), resulting in an increased likelihood of a higher BMI (Kemp, Bui & Grier, 2011). Ganley (1989) highlighted that the assumption that hunger always results in eating is false. In some cases, emotional eating may occur even though the individual feels full to the point of sickness e.g., headaches, nausea, and vomiting (Loro & Orleans, 1981). In such cases the word hunger is better replaced with terms such as “cravings” or “desiring”. Doğan, Tekin and Katrancioğlu (2011) highlighted a number of differences between emotional and physical hunger, such as; (a) emotional hunger occurs suddenly whereas physical hunger is a gradual process; (b) emotional hunger requires immediate satisfaction whereas physical hunger can wait; (c) emotional hunger may result in feelings of guilt whereas physical hunger does not; (d) physical hunger usually subsides when the individual feels full whereas emotional hunger may carry on regardless; (e) physical hunger is due to a physiological need for survival as opposed to emotional hunger which is caused by an emotional trigger, and may be regarded as a short-term coping mechanism.

The concept of emotional eating has been criticised because the exact process of how emotions impact on eating behaviour is an unresolved

⁶⁶ Please refer to the section 1.7 on theories of emotional eating as some explain this problem due to a false perception of hunger.

phenomenon, with some researchers hypothesising that it is not the emotion itself which leads to a change in eating behaviour but how the individual deals with the emotion (Wiser & Telch, 1999). Furthermore, the characteristics of emotional eating make it difficult to research; this is because as a concept it has an episodic relationship to positive and negative emotions, or either one depending on the individual. Additionally, emotional eating is difficult to measure due to individual variability (based on sex, age, type of stressor); the existing research findings are mixed, with some studies considering emotional eating as prevalent across gender and various social classes (Canetti, Bachar & Berry, 2002), and others highlighting its predominance in females (Provencher, Drapeau, Tremblay, Despres & Lemieux, 2003). Emotional eating can prove quite an evasive phenomenon due to the secrecy surrounding the behaviour itself; in that it tends to occur when individuals are alone (Ganley, 1989; Rutledge & Linden, 1998; Oliver & Wardle 1999; Schotte, Cools & McNally, 1990; Wardle, Steptoe, Oliver & Lipsey, 2000). It is, therefore, possible that the lowered numbers of males who engage in emotional eating are not captured (Provencher et al., 2003). It is also plausible that epidemiology may be explained by social norms whereby it may be considered more socially acceptable for females to engage in emotional eating.

Regardless of its prevalence in terms of gender, emotional eating is highly prevalent in adults, particularly those who are overweight or obese (Ganey, 1989; Van Strien, Frijters, Bergers & Defores, 1986; Van Strien, Hermen & Veheijden, 2009; Van Strien, van der Zwalew & Engels, 2010). Such prevalence may be attributed to overeating being seen as a socially acceptable explanation for those who are already overweight (Canetti et al., 2002). It may also be likely that such individuals are exposed to this view in weight loss books (Allison & Heshka, 1993).

By contrast, emotional eating has low prevalence rates in children (Carper, Fisher & Birch, 2000; Wardle, Steptoe, Oliver & Lipsey, 2000) suggesting that it may emerge in adulthood, that it is poorly identified in young people, or that it may occur in a different format such as a desire for energy-dense treats or snacks (Mela, 2001; Tanofsky-Kraff et al., 2004).

Certainly, the epidemiology of emotional eating is unclear; this may be as the concept is poorly defined and not classified medically or diagnostically⁶⁷ as a distinct pathology. Arguably, this avoids the stigmatisation of individuals who engage in emotional eating, as the term itself may already be considered negatively loaded. Nevertheless, recognising emotional eating as a diagnostic category would potentially make it more amenable to studying in research and may ease communication (Carr & McNulty, 2006).

In addition, from a biological perspective, emotional eating does not make logical sense, particularly in response to negative emotions (Wing, Blair, Epstein & McDermott, 1990). For survival purposes, negative emotions typically result in satiety and loss of appetite (Schachter, Goldman & Gordon, 1968 as cited by Van Strien & Ouwens, 2003). Furthermore, from a functional perspective, emotional eating may be considered maladaptive as emotions are expected to play a role in preparing an individual in responding to environmental demands, and such eating habits may serve as a barrier to survival (Evers, de Ridder & Adriaanse, 2011).

Emotional eating, like obesity, is linked with low self-esteem (Bruch, 1973). It is postulated that individuals who engage in emotional eating have perfectionist tendencies, a sense of interpersonal distrust or ineffectiveness, and find it difficult to identify and communicate their feelings (Van Strien, Clevelen & Schippers, 2000; Waller & Osman, 1998). The latter, a difficulty identifying and describing feelings, has been termed “alexithymia” (Taylor, Parker, Bagby & Bourke, 1996). Alexithymia has been linked to emotional eating in individuals who are obese (Larsen, Van Strien, Eising & Engels, 2006) or who have been diagnosed with binge eating disorder (Pinaquy, Chabrol, Simon, Louvet & Barbe, 2003). Furthermore, poor recognition of internal cues relating to hunger and satiety is associated with alexithymia (Taylor et al., 1996). Moreover, poor interceptive awareness of internal cues has been linked with emotional eating in females (Van Strien et al., 2000) and it is considered predictive of emotional eating generally (Van Strien & Ouwens, 2007).

⁶⁷ Emotional eating may be classed as Other Specified Feeding or Eating Disorder (OSFED, DSM-V; APA, 2013). This group comprises of approximately half of individuals who present with an eating disorder (Fairburn, 2008).

The relationship between emotional eating and being overweight/obese has been considered bidirectional (Ganley, 1989; Canetti et al., 2002; Macht, 1999; Keys, Brozek, Henschel, Mickelsen & Taylor, 1950). This is as positive/negative psychological states may contribute to emotional eating, for example, individuals may increase their intake of fat and sugar when distressed which may result in a surplus of calories (Bongers, Jansen, Havermans, Roefs & Nederkoorn, 2013; Dallman, 2010). Furthermore the direction of causality is skewed by evidence indicating that, in contrast to individuals within the normal weight range, those who are overweight or obese are more likely to suffer from anxiety and depression (Petry, Barry, Pietrzak & Wagner, 2008). Therefore, determining whether emotional states are precursors or consequences of emotional eating is difficult. The relationship is made more complex due to the range of risk factors which may contribute to weight gain, which emotional eaters might engage in, including craving carbohydrates or energy-dense and highly calorific foods, consuming bigger portion sizes, living a sedentary lifestyle so less likely to burn the surplus of calories, or a sensitivity to rewarding food cues that may result in overeating (Faith et al., 1997). Indeed, Ganley (1989) emphasises the need to consider individual variability when addressing emotional eating.

The claim that emotional eating plays a role in poor weight management may be considered unreliable by some researchers/clinicians due to the methodological weaknesses of some of the studies in relation to control groups, social desirability and a failure to control for type one errors (Allison & Heshka, 1993). This is particularly the case considering how eating and emotion differs across individuals and according to different emotions (Canetti et al., 2002). Additionally, the fact that emotional eating occurs in a range of eating disorders including anorexia nervosa (AN; Ricca et al., 2012), bulimia nervosa (BN; Ricca et al., 2012), and binge eating disorder (BED; Gibson, 2006)⁶⁸, and as well as in

⁶⁸ Emotional eating differs from binge eating in that binge eating is a clinical diagnosis which requires the consumption of a large quantity of food, whereas emotional eating occurs in nonclinical populations and does not require an excessive food intake (Gibson, 2006). However, a common factor amongst emotional eating and binge eating is that both behaviours may reduce negative emotions (Gibson, 2006).

individuals within a healthy weight range (Evers et al., 2010) also questions the relationship between eating and emotions. It is possible that some individuals may consume more calories in response to mood but compensate for these through increasing their physical activity and as a result do not over-ingest calories and subsequently do not gain weight. The fact that emotional eating seems to occur in individuals who are within the normal weight range or in those who are underweight may offer doubt as to whether it is the best variable to target when helping individuals with weight management. However, the lack of clarity in the literature means that this is an important area to investigate further in order to enhance our understanding.

1.6 ACT

A brief overview of ACT and Relational Frame Theory (RFT) is outlined before discussing the ACT processes and critiquing the ACT model.

1.6.1 ACT and RFT. ACT is underpinned by RFT (Hayes, Barnes-Holmes & Roche, 2001; Fletcher & Hayes, 2005; Dymond & Roche, 2013; Hayes, Pistorello & Levin, 2012) which is a comprehensive theory of human language and cognition. RFT places a strong emphasis on context and differentiating between thinking and function. According to RFT, the elements of human cognition are determined by verbal processes. Although these processes are useful for cognitive purposes, such as thinking and reasoning, from an ACT perspective, they can become detrimental and contribute to human suffering.

Attempts to alter internal experiences such as memories, cognitions, and emotions may result in a context that increases their functional importance. Due to an individual's ability to associate a memory or a thought with emotional content and painful events, merely having a memory or a thought in the absence of the aversive consequence, may be sufficient in evoking distress. In other words, language may cause psychological pain, even without the presence of a painful stimulus (Hayes, Strosahl & Wilson, 1999), by triggering negative thoughts, memories and feelings or worries about the future (Hayes & Smith, 2005). In doing so, individuals may start to relate to thoughts or emotions in response to innocuous stimuli which can result in harmful behaviours and maladaptive consequences (Lillis & Kendra, 2014). Furthermore, because

language may be applied arbitrarily, this has implications for widening the remit in which psychological pain is experienced.

Subsequently individuals are likely to avoid thoughts/ feelings associated with the aversive stimuli. However, attempts to avoid pain through distraction (e.g., thinking of something else) may increase the likelihood of distress. More specifically RFT may explain the phenomena of experiential avoidance, as in the absence of the aversive or feared stimuli, the associated words - in terms of thoughts and feelings - may acquire the aversive function (Barnes-Holmes, Barnes-Holmes, McHugh & Hayes, 2004). One way of trying to influence or change one's state in an effort to avoid distress is through emotional eating. However, this is only effective in the short-term.

1.6.2 ACT processes. The ACT model considers psychopathology or distress to occur as a result of psychological inflexibility, and so ACT aims to increase this by helping the individual to be more mindful of their inner experiences and behave in ways which fit with their values (Hayes, Strosahl & Wilson, 1999). In order to achieve this, ACT is comprised of six main processes; acceptance; defusion, self-as-context; being present (or being mindful); values and committed action. A brief outline of each process is outlined below.

“Acceptance” is considered as an alternative to avoidance (Hayes, 2004). Acceptance involves acknowledging and being aware of one's thoughts as they are without trying to change them. Acceptance may be viewed as a form of exposure to feared stimuli. The acceptance or exposure of feelings enables new behavioural patterns and functions to form. Acceptance increases psychological flexibility as thoughts are not perceived as threatening stimuli which need to be avoided, masked, or controlled (Luoma, Hayes & Walser, 2007).

The second ACT process is “cognitive defusion”, this involves viewing thoughts in their literal sense, as thoughts, rather than their meaning or significance. Helping an individual to separate them self from their thoughts changes the subsequent function of the thoughts, allowing the individual to relate to their thoughts differently and facilitating flexible responding and a broader behavioural repertoire (Luoma et al., 2007; Hayes et al., 1999).

The third process, “self-as-context”, relates to being open to experiencing emotions and being aware that these may change, and then viewing the self as

more than thoughts, feelings and physical sensations. The mind may be divided into two parts, the “thinking self” and the “observing self” (Harris, 2009). Self-As-Context allows the self to be viewed as a separate entity from experiences. This enables the individual to view themselves as separate from the problem (Hayes, 2004).

The fourth process is “being present” (contacting the present moment) which allows the world to be experienced directly through observation without judgement rather than via verbal evaluations (Hayes, 2004). This process may be considered akin to mindfulness (by deliberately bringing our awareness to either internal or external events and paying attention to moment-to-moment changes). An increased awareness allows an individual to recognise the present moment and consciously make decisions and choose effective behaviours in line with their values (Harris, 2009).

The above four processes are termed mindfulness processes (Blackledge & Hayes, 2001). The remaining two processes are “values” and “committed action”, which are regarded as behavioural change processes (Blackledge & Hayes, 2001). The main objective of ACT is to increase engagement and living in line with one’s values, or life areas, which they consider important (Hayes, 2004). “values”⁶⁹ are chosen qualities based on what the individual considers as important in different life domains, such as employment and family life. Values are not goals (Hayes & Smith, 2005), instead values provide direction about how we want to behave in life and what we want our life to be about (Harris, 2009). Clarifying an individual’s values may result in highlighting reinforcers resulting in more healthy choices. “Committed action” on the other hand is considered as a specific goal which enables valued living (Hayes et al, 2006). Commitment may be perceived as the ability of allowing values to guide behaviour instead of thoughts (Hayes, 2004).

1.6.3 A critical appraisal of ACT. ACT is critiqued as a psychological model (below) in line with the guidance by Moghaddam & Dawson (in press)

⁶⁹ Due to the difficulty operationalising values, they may be considered a controversial concept. However, an alternative way of understanding them is as “distal reinforcements”, in other words, as a way or method of responding which results in increased access to sources of positive reinforcement (Blackledge & Barnes-Holmes, 2009).

based on recommended criteria for evaluation (Cramer, 2013; Patterson, 1983; Prochaska, Wright & Velicer, 2008; Sharf, 2015).

1.6.3.1 Clarity and parsimony. A model is determined as clear and parsimonious if it is understandable, internally consistent, and if the key concepts are specific. Proponents of ACT have argued that the model accounts for the development and maintenance of behaviours and takes language into account (Hayes, 2004). However, ACT uses language which may be viewed as complex and convoluted e.g., fusion; experiential avoidance and psychological flexibility. For example, Johnston, Foster, Shennan, Starkey, and Johnson (2010) evaluated an ACT self-help intervention for chronic pain and reported that participants had difficulty understanding certain ACT concepts, such as defusion and mindfulness. Participants also considered the self-help book as being of a medium to hard level resulting in Johnston and colleagues concluding that the concepts may need to be simplified for participants, particularly those undertaking such a treatment modality. Furthermore, the six ACT processes may be divided into three dyadic processes (open, aware and engage). Therefore, ACT may be criticised for being overly complex and using redundant concepts.

1.6.3.2 Precision and testability. A model is considered as precise and testable if the concepts are operationally defined and measurable, and if it provides testable hypotheses. The six ACT processes are clearly defined and interconnected, and there are measures available to assess each of the concepts. However, there is some evidence to suggest that some of the ACT measures are unreliable as they are symptom-focused in that they measure the problem as opposed to the process. Therefore, the lack of valid measures compromises the testability of the model. Furthermore, given that the ACT processes may be collapsed into a smaller number of constructs as mentioned above, this apparent overlap highlights scope for improvement in terms of the precision of the model. Another critique is that the concepts and metaphors may be perceived incorrectly which may interfere with their testability. In addition to this, there is controversy in the literature regarding the overlap between ACT and CBT, with the process of “acceptance” being considered akin to cognitive restructuring (Arch & Craske, 2008; Hofmann & Asmundson, 2008; Wolgast,

Lundh & Viborg, 2013). Therefore, this casts doubt on the precision of the ACT model.

The mechanism of change in ACT is psychological flexibility, which is negatively associated with psychopathology (Chawla & Ostafin, 2007). However, more research is needed regarding the mechanisms of change with a particular focus on the ACT processes (Gaudiano, 2011; Hayes, Luoma, Bond, Masuda & Lillis, 2006). Although, there is some evidence indicating that ACT appears to work according to processes like psychological flexibility, experiential avoidance, defusion and values (Hayes & Lillis, 2012), this evidence is mainly from correlational or cross sectional studies (Hayes, Levin, Vilardaga & Yadavaia, 2008). Therefore, caution needs to be aired, as in some studies outcomes had changed prior to the measurement of mediators which raises methodological issues (Hayes & Lillis, 2012). This gives further support for the need for more SCEDs, which ACT proponents have called for (Gaudiano, 2011).

1.6.3.3 Empirical adequacy. Empirical adequacy is determined on the basis of whether the model can account for the available evidence and if any predictions based on the model are considered accurate, as well as if the mechanisms/processes proposed by the model are empirically validated. In relation to this, the ACT model has a mixed evidence-base (Corrigan, 2001; Hayes, 2002) with some evidence highlighting its effectiveness but with queries regarding how, why and for whom. For example, Corrigan (2001) argued that ACT was making claims beyond its data, and the large number of non-empirical studies in comparison to empirical studies, was considered evidence of this. However, in response, Hayes (2002) refuted that ACT proponents have done so, highlighting that the proportion of non-empirical studies to empirical studies is not a proxy of effectiveness.

The effectiveness of ACT has been highlighted in a number of studies, including meta-analyses and reviews (Hayes et al., 2006; Powers, Zum Verde Sive Verdling & Emmelkamp, 2009; Ruiz, 2010). There is some evidence that ACT has been considered helpful for a range of problems, including binge eating, depression, chronic pain, addiction, psychosis, and anxiety (Lundgren, Dahl & Hayes, 2008; Kristeller & Hallett, 1999; Hayes & Lillis, 2012; Ruiz, 2010). Öst (2014) deemed ACT as possibly efficacious as an intervention for

obesity. Analogue laboratory studies and studies including a mediation analysis of outcome have demonstrated that ACT is effective at encouraging adaptive behaviour (Gifford et al., 2004) with particular support in smoking cessation and diabetes management (Hernández-López, Luciano-Soriano, Bricker, Roales-Nieto & Montesinos Marin, 2009). A meta-analysis across all existing ACT studies indicate a between-group effect size of .65, suggesting that ACT showed a medium to high effect in comparison to control groups (Hayes et al., 2006; Pull, 2009; Ruiz, 2010). Furthermore, improved effects have been maintained at yearly follow-ups (Westin et al., 2011), and more interestingly further improvements have been found for those in ACT conditions at follow-up in comparison to post-intervention (Hayes et al., 2004).

However, the supporting evidence has been undermined by its methodological limitations (Öst, 2008), for example, small sample sizes and the lack of control for therapist effects. However, it is important to note that the review by Öst was heavily critiqued due to the mismatch of samples used (Gaudiano, 2009). Öst (2014) conducted a later meta-analysis of ACT comparing it to CBT and was more critical of ACT in comparison to his previous review, citing the evidence for the model as weak and highlighting the lack of evidence regarding the processes and mechanism of change. Indeed, research regarding mediation based on temporal precedence of variables and outcomes has only been shown in a few studies (e.g Varra, Hayes, Roget & Fisher, 2008). This picture is complicated given that ACT has been routinely combined with other established interventions and have not used a dismantling design making it difficult to attribute any obtained effects to ACT. The most conservative conclusion may be that ACT works better than no intervention or treatment as usual (TAU; Hayes & Lillis, 2012). Broadly, ACT appears to be at least as effective as other evidence-based interventions, including CBT (Hayes & Lillis, 2012; Guadiano, 2009). Nevertheless, further research is warranted.

1.6.3.4 Comprehensiveness and generalisability.

Comprehensiveness and generalisability relates to whether the model is holistic, if it applies across a range of contexts and clinical phenomena, and if it transfers to different situations. The ACT model is comprehensive in its inclusion of cognition and language (Hayes, 2004). There is an increased evidence base for ACT for a range of psychological problems (Blackledge &

Barnes-Holmes, 2009) with research indicating that it may be classed as a transdiagnostic treatment due to its application in a broad range of clinical domains and as experiential avoidance accounts for human suffering (Hayes, 2004; Lillis & Hayes, 2012; refer to section 1.6.3.3 to avoid duplication). ACT focuses on the function of distress rather than topographical differences (Ruiz, 2010). ACT does not strive for symptom reduction but to enable an individual to behave according to their values without being controlled by their psychological experiences (Luoma et al., 2007). However, symptom reduction may be an ancillary effect (Hayes, 2004). In the process of doing so, psychological distress/symptoms may reduce (Harris, 2009). The processes of change are well specified in ACT and do not vary according to each problem. ACT is context-focused and it may be applied to a range of clinical phenomena using the same mechanism of change (psychological flexibility). The philosophical roots of ACT are grounded in functional contextualism (see section 2.1) which strives to explain and predict phenomena with “precision, scope and depth” (Hayes, 2004).

1.6.3.5 Utility and applied value. The utility and applied value of a model is determined by whether it provides a useful framework for practice, and if interventions based on the model demonstrate effective solutions to difficulties. ACT is broadly applicable and enables workability for a clinician as guided by the six core ACT processes. When focusing on workability, clinical outcomes are determined by the individual’s values (Hayes et al., 2012). Furthermore, interventions based on ACT have shown preliminary promising evidence regarding their effectiveness with a broad range of populations and clinical problems (such as anxiety, depression, psychosis, chronic illness, substance use, and eating disorders; Hayes, Masuda & De Mey, 2003). From an ACT perspective, such problems are maintained by experiential avoidance and so ACT aims to help the individual accept their difficulties, whilst being more mindful of their decision-making in order to behave in a value-consistent way. ACT has shown to be helpful to diverse populations (Hayes & Lillis 2012) and shown good outcomes with minority groups (Muto, Hayes & Jeffcoat 2011; Gaudiano & Herbert, 2006). ACT may be applied to a wide age range, including children/adolescents (Wicksell, Melin & Olsson, 2007) and older adults

(Wetherell et al., 2011). ACT has also demonstrated utility with individuals with impaired cognitive ability (Sylvester, 2011).

1.7 Theories of Emotional Eating

There are a number of competing theories which may explain emotional eating; some of which are grounded in the obesity literature (Canetti et al., 2002). For the purposes of this section, theories which may explain emotional eating have been categorised as either relational or appraisal-based/cognitive, and an example from each category is detailed followed by a brief overview of other relevant theories within that family of approaches. In addition to this, broad consideration is then given to how ACT sits in relation to these approaches.

1.7.1 Relational-based theories. Relational-based explanations for emotional eating consider early attachment bonds and family dynamics as influential in explaining emotional eating. From a relational perspective, eating may be viewed as a defence mechanism in an effort to reduce anxiety, which also serves to allow proximity to a caregiver, who may respond with concern (O' Kearney, 1997; Orzolek-Kronner, 2002). Typically, such theories may account for the ongoing nature of emotional eating, and possibly account for lapses/relapses, but generally struggle to explain the progression of this type of eating pattern.

From an attachment theory (Bowlby, 1969; 1973; 1980; 1982) perspective, positive early experiences contribute to a secure attachment style which in turn shapes the strategies (*attachment behaviours*) an individual engages in to increase their sense of safety, whilst also enabling the development of emotional regulation skills (Ainsworth, Blehar, Waters & Wall, 1978; Grossmann, Grossmann & Waters, 2005; Levitan & Davis, 2010). Food is representative of care, facilitating attachment to the parent and plays a pivotal role in an individual's early years of reliance on caregivers (Bowlby, 1982, 1973). Therefore, if early experiences and interpersonal dynamics have meant that the individual experienced an unpredictable/inconsistent caregiver, this may result in an insecure attachment style and poorly developed emotion regulation skills (Ainsworth, et al., 1978; Buckroyd & Rother, 2008; Pepping, O'Donovan, Zimmer-Gembeck & Hanisch, 2015), potentially leading them to adopt unhelpful eating behaviours.

Individuals with insecure attachment styles may resort to behaviours like emotional eating at times of perceived threat; food is a basic need for survival and may provide comfort and serve as a means of compensation if experiencing relational difficulties (Bowlby, 1982; Levitan & Davis, 2010). Given that individuals with attachment difficulties perceive the world and those in it as “untrustworthy”. They, therefore, develop a need to be “in control” of their environment. Emotional eating may fall within this remit, as does hoarding food, eating impulsively and secretively, all of which are typical behaviours in individuals with attachment difficulties (Stapleton & MacKay, 2014). Preoccupied attachment styles (whereby others are viewed positively but the self is viewed negatively) in particular have been considered as a significant predictor of emotional eating (Mallinckrodt, 2010; Stapleton & MacKay, 2014; Suldo & Sandberg, 2000). However, more research is needed in this field as there are a lack of studies on emotional eating and attachment in comparison to eating disorders more generally (Zachrisson & Skarderud, 2010; O’Kearney, 1996).

A number of other theories may be viewed as relational accounts of emotional eating, including psychosomatic (Kaplan & Kaplan, 1957), psychodynamic (Swift & Stern, 1982), and systemic theories (Dallois, 2003). The psychosomatic theory of obesity proposed by Kaplan and Kaplan (1957) in particular, indicates that individuals eat to reduce anxiety. From this stance, eating helps alleviate negative emotions, regardless of hunger and energy requirements, and subsequently may result in weight gain. Psychosomatic theory (Kaplan & Kaplan, 1957) may be conceptualised as a psychodynamic theory whereby emotional eating may be considered as representative of psychosexual fixation, occurring in the oral stage of development (Faith et al., 1997). More specifically from a psychosomatic perspective, early learning experiences result in eating becoming associated with expressions of love/reward (Stroebe, Papies & Aarts, 2008), and, therefore, this theory may also correspond with the cognitive/appraisal-based category outlined below.

Similar to attachment theory (Bowlby, 1969), psychosomatic theory (Kaplan & Kaplan, 1957) has been supported by qualitative research whereby individuals who engage in emotional eating have reported experiencing interpersonal difficulties in childhood and later in life seeking emotional

connectedness (Goodspeed, Grant & Boersma, 2005). From a systemic perspective, hypothesised mechanisms by which disordered eating occurs include overprotection, enmeshment or a lack of conflict resolution in the family unit. Therefore, from a systemic stance, behaviours like emotional eating, place emphasis on the individual by the family/system resulting in a feedback loop of ineffective solutions (Dallos, 2003).

1.7.2 Cognitive/appraisal-based theories. This family of approaches consider experiences in childhood regarding food consumption as critical in the development and formation of life-long eating habits (Wansink, 2006). One approach which belongs to this family of theories is CBT. CBT has been the most widely researched therapeutic approach for eating disorders, such as anorexia nervosa, bulimia nervosa, binge eating disorder and obesity (Ghaderi & Anderson, 2010; Wilson, 1999; Cooper & Fairburn, 2001). From a CBT perspective, cognitive appraisal serves as a mediator of change, impacting on an individual's feelings and behaviours (Beck, Rush, Shaw & Emery, 1979). Therefore, CBT addresses a behaviour like emotional eating by targeting thoughts. Emotional eating is maintained through cognitions (maladaptive thoughts) and behaviour (rigid dieting/binging) (Cooper, Fairburn & Hawker, 2003; Fairburn & Harrison, 2003; Perri & Fox, 2005).

Behaviours are viewed as being shaped through conditioning processes, namely operant and classical conditioning (Ferster, Nurnberger & Levitt, 1962). For emotional eating, classical conditioning may occur when an emotional state is associated with the consumption of food (e.g., associating a good mood with having a "treat"). Given that certain foods may be experienced as pleasurable, they may be considered extra rewarding by providing relief for those experiencing unwanted emotions (Baker, Piper, McCarthy, Majeskie & Fiore, 2004).

Operant conditioning explains the continuation of emotional eating behaviour due to the emotional relief gained from eating which increases the likelihood of future eating when experiencing unwanted emotional states. In a certain context, the behaviours are likely to re-occur due to the consequences which may be perceived as either reinforcing or punishing. Reinforcement increases the likelihood of future behaviour and it is differentiated into two types; positive and negative reinforcement. The former, positive reinforcement,

occurs when something is added which may be considered as an appetitive incentive as food is a natural reinforcer (e.g., eating chocolate as a reward for hard work) which increases similar actions in the future (Skinner, 1938). However, in contrast, the latter, negative reinforcement is whereby the removal of something (e.g., emotions the individual finds intolerable) increases the likelihood of the behaviour in the future (Skinner, 1938; Hawkins & Clement, 1984). Reinforcement results in the maintenance of behavioural patterns like those relevant to emotional eating.

Other theories which may be regarded as cognitive/appraisal-based include social learning theory (Bandura, 1971; 1973), the restraint/disinhibition theory of obesity (Herman & Polivy, 1983); Schacter's (1968) internal and external theory (as cited by Van Strien & Ouwens, 2003); and Bruch's (1973) theory. Social learning theory stipulates that learning is modelled on others. Given that eating may be viewed as social, for example, having a meal to celebrate good news, individuals may learn that eating makes them feel good and is considered rewarding (classical conditioning). Furthermore, individuals may model or copy similar eating behaviours to those they are in close contact with, so for example, if someone close to them deals with unwanted emotions by eating, this may then increase the likelihood of this behaviour. However, there are problems in applying social learning theory to explain emotional eating. This is as other social learning would mitigate the likelihood of emotional eating, for example, it may be considered socially inappropriate to consume large amounts of food or eat in response to emotions due to the stigma associated with obesity (Fazio & Olson, 2003). Moreover, emotional eating is more likely to occur in secret, thus limiting opportunities of modelling the behaviour for others. It is, therefore, questionable how such a behaviour is copied if conducted mostly out of sight.

Due to problems with inner cognitive structure and difficulties labelling/recognising emotional states, or poor monitoring of situations, theories such as the restraint/disinhibition theory (Herman & Polivy, 1983) of obesity; Schacter et al. (1968) internal and external theory (as cited by Van Strien & Ouwens, 2003) and Bruch's (1973) theory may be grouped in the cognitive/appraisal-based category. Although a theory of obesity, the restraint/disinhibition theory (Herman & Polivy, 1983) may be applied to

emotional eating as it proposed that individuals attempt to maintain their weight by dieting, which involves a certain amount of cognitive effort, which may be compromised by negative emotions.

Regarding the internal and external theory (Schacter et al., 1968 as cited by Van Strien & Ouwens, 2003), fear and anxiety are hypothesised to result in suppressing food consumption in individuals within a normal weight range but for individuals who are overweight this is not the case as they are considered unable to recognise their inner cues (due to faulty learning). This theory also recognised the importance of external environmental cues in influencing eating behaviour. However, this theory seems to mainly account of the maintenance of emotional eating but lacks a clear explanation for its development.

The internal/external theory (Schacter et al., 1968 as cited by Van Strien & Ouwens, 2003) is similar to Bruch's (1973) theory in that Schachter et al. (1968) hypothesised that poor recognition of internal cues resulted in over-eating in individuals who were overweight or obese in comparison to those within a healthy weight range, who had learned to appropriately recognise hunger. Bruch's theory (1973) may also be viewed as overlapping in some respects with the psychosomatic theory (Kaplan & Kaplan, 1957) as it proposed that individuals learn to eat to alleviate distress because they have not learned how to differentiate hunger from upset. However, rather than eating as an emotional defence; it is considered as a result of faulty learning.

Both theories proposed by Bruch (1973) and Schachter et al. (1968, as cited by Van Strien & Ouwens, 2003) highlight that learning has played an important role in terms of hunger and shaping individual's response patterns. Bruch (1973) also postulated that early experiences, if confusing, may impact negatively on an individual's ability to recognise hunger and satiation and also make it difficult for the individual to distinguish hunger from other uncomfortable feelings such as emotional tension. Therefore, in response to unwanted feelings, an individual is more likely to overeat.

1.7.3 Critique of relational and cognitive/appraisal-based theories. A common theme across relational-based theories is that eating relates to emotions in response to interpersonal difficulties in the absence of hunger. Such theories may be critiqued on the basis that due to their broad focus, they struggle to explain how and why the behaviour begins and persists.

Psychosomatic theory (Kaplan & Kaplan, 1957) has been critiqued on the basis that the exact mechanisms by which eating reduces anxiety are not clearly understood (Canetti et al., 2002). It is postulated by researchers in this field that a possible mechanism for this relates to the effects of different food types (e.g., proteins and carbohydrates) which may impact on neurotransmitters like serotonin in the brain and eliminate such emotions temporarily, though they suggest this in combination with learning factors (e.g., an earlier positive experience with the food) (Kaplan & Kaplan, 1957). Social validity is one strength of relational theories (Faith et al., 1997). However, in comparison to cognitive/appraisal-based theories, the level of evidence for relational-based theories regarding this clinical focus is lacking.

Although attachment theory (Bowlby, 1982) considers behaviour in the context of relational experiences, it may be critiqued due to the associated research limitations, for example, there is a lack of empirical evidence on the impact of emotional bonds on attachment styles later in life (Levitt, 1991). Moreover, recall bias may impact on the findings of research on attachment, further distorted by the lack of validation from attachment figures (Hassan, 2005; Zachrisson & Skarderud, 2010). Attachment theory, like other relational accounts, fails to adequately explain the trajectory of emotional eating, this is highlighted given that there may be an overlap in psychopathology in individuals with similar attachment styles. Therefore, determining how individuals may develop different forms of behaviour in response to distress, such as an eating disorder or anxiety, is unknown. Theories like behaviourism may account for some of the limitations of attachment theory, such as poor predictive specificity. From a behavioural stance, an individual's biology, learning history and current context elicits the behaviour of emotional eating (Dawson, Gresswell, St Ledger & Moghaddam, 2015).

Broadly, the ACT model may be considered to overlap in some respects with relational-based theories. ACT takes the position that all behaviour is contextually defined and so this has links to systemic theory, for example, as relationships are considered important in influencing behaviour. Furthermore, the ACT model places a lot of emphasis on values, orientating the individual to consider their own values and reflect on whether they are their actual values, or in the case of systemic theory, they may be classed as the system's values.

Bruch's theory (1973) may be considered to have some overlap with the ACT model as experiential avoidance may occur due to poor recognition of emotions, a lack of effective self-monitoring or attempts to avoid unpleasant inner experiences (e.g., thoughts and feelings) regardless of the subsequent harm (Hayes et al., 2006).

In comparison to relational theories, ACT and CBT are similar in that both place a stronger emphasis on the present moment and the future, more so than the past, and aid an individual's subjective distress by considering thoughts as distinct from the self, and incorporating behavioural strategies (Gaudiano, 2011). In terms of differences, CBT considers psychological difficulties as having distinct patterns of information processing biases, which if addressed, result in symptom improvement (Beck et al., 1979). However, in contrast, ACT views psychopathology as a result of psychological inflexibility and attempts to control internal experiences.

ACT overlaps in some ways with appraisal-based approaches like CBT as the role of thoughts in both approaches is important. CBT strives to reduce or challenge maladaptive thoughts and feelings, whereas from an ACT perspective, emphasis is placed on the relationship to thoughts rather than efforts of challenging them (Arch & Craske, 2008). Theories like CBT advocate cognitive restructuring in order to reduce the subsequent emotional response. However, from an ACT perspective, the emotions will remain regardless and one can choose to either accept them or respond to urges (Hofmann & Asmundson, 2008). Similarly, one cannot eliminate cognitions like a CBT model may suggest, therefore, from an ACT perspective, it is necessary to change the response to the cognition.

As an intervention, both ACT and CBT are similar in that both strive to increase external awareness in order to produce improvements. ACT places more emphasis than CBT on the importance of language, recognising that in that it places one in contact with negative emotions. This may account for how one may experience distress in response to private events/thoughts rather than an external trigger/antecedent⁷⁰.

⁷⁰ See section 1.6.1.

The processes between ACT and CBT differ, ACT draws on a range of techniques in relation to the core processes whereas CBT identifies and alters distorted cognitions using cognitive and behavioural strategies (Gaudiano, 2011). However, ACT does draw on some CBT techniques but pursues a different treatment goal; CBT targets antecedent-emotion focused coping whereas ACT addresses response-focused coping (Hofmann & Asmundsen, 2008). ACT aims to help an individual “accept” their emotions in order to achieve their values in the longer-term. By increasing an individual’s awareness of the self, ACT aims to enable them to view inner experiences as separate, thus allowing the individual to choose behaviours congruent with their values (Lillis, Hayes, Bunting & Masuda, 2009). Arguably, appraisal-based theories such as CBT, cognitive theory or learning theory provide a stronger account for the development and maintenance of behavioural patterns associated with emotional eating (Booth, 1994).

However, even though there is good evidence to support CBT some of the time with some individuals experiencing disordered eating, it has not been considered the most effective or suitable treatment option for all individuals, with evidence indicating that it does not result in a reduction in symptoms for all (Wisniewski, Safer & Chen, 2007) and results in poor or short-lived outcomes for some individuals (Fontaine & Cheskin, 1997; Shaw et al., 2005), and is even iatrogenic in certain cases (Longmore & Worrell, 2007; Marcks & Woods, 2005). Furthermore, individuals who are classified as “emotional eaters” (score highly on internal disinhibition) generally respond poorly to CBT, but benefit from ACT (Lillis et al., 2015). Nevertheless, ACT may be understood better in relation to the cognitive behavioural tradition in comparison to relational-based theories. However, it is noted that ACT relies on the therapeutic alliance as the vehicle for change and so it also draws on relational and contextual learning. Both relational and cognitive-based approaches consider emotional eating differently, with cognitive/appraisal theories placing a strong emphasis on the cause/aetiology, but relational theories not providing a strong account of the onset but explaining how emotional eating persists.

1.8 Research on ACT and Weight Management

Encouraging findings for ACT in promoting change in health behaviours has been found. Recently, ACT has been successfully applied to weight

management. A brief summary of seven main studies (Lillis et al., 2009; Tapper et al., 2009; Niemeier et al., 2012; Weineland, Arvidsson, Kakoulidis & Dahl, 2012; Forman et al., 2012; Katterman et al., 2014; Hill, Masuda, Moore & Twohig, 2015) in this field are outlined in turn below.

In the United States of America (USA), Lillis et al. (2009) randomly assigned overweight participants (N = 84), who had previously completed six months at weightwatchers, to a waiting list or to a one day ACT-based workshop targeting obesity-related stigma and psychological distress. Lillis and colleagues proposed that weight loss maintenance was difficult, particularly amongst those with poor coping skills, and therefore, proposed that targeting experiential avoidance may help. At the three month follow-up, ACT participants showed greater improvements in a range of areas including obesity-related stigma, body mass, psychological flexibility and weight-specific acceptance in comparison to the control group. A criticism of this study is that the sample mainly consisted of white, middle-class females and so the generalisability of the findings is questionable. Furthermore, there was no measure of treatment fidelity used in this study which is another limitation.

In the only UK study exploring ACT for weight management, Tapper et al. (2009) randomly assigned females (N = 62) who were motivated to lose weight to attend either four two-hour mindfulness-based workshops or a control condition (instructed to continue with their dieting without further intervention). Tapper and colleagues highlighted a relationship between emotional eating and obesity, and considered emotional eating as a form of experiential avoidance. The authors proposed that ACT would help reduce emotional eating and aid weight loss through addressing experiential avoidance. At six months, workshop participants had an increase in physical activity and lost more weight in comparison to those who did not apply the workshop advice. One drawback of this study was that the intervention had no impact on emotional eating which may have been because of participants' self-reported difficulty in understanding some of the acceptance-based terminology. This study, like the one by Lillis and colleagues, aimed to complement the weight loss activity the client was already involved in, so did not incorporate specific weight loss techniques.

In the USA, Niemeier et al. (2012) conducted the first study to specifically target emotional overeaters by recruiting those who scored highly on a

screening tool for emotional eating. They examined a six-month acceptance-based intervention for weight loss for 21 males and females who had difficulties with internal disinhibition (eating in response to emotions and thoughts). The authors proposed that those who scored highly for emotional eating were more likely to struggle with weight loss. Outcomes from the intervention included weight loss and decreases in internal disinhibition (emotional eating) at follow-up. The authors recommended further investigation of this area with a more heterogeneous sample.

In Sweden, Weineland et al. (2012) conducted a RCT (N = 39) to examine the efficacy of a six week internet-based ACT intervention in preventing weight regain amongst bariatric patients. Participants in the ACT condition showed improvements in eating behaviour (reduction in emotional eating), body dissatisfaction, psychological flexibility and quality of life, in comparison to those in the TAU condition. A methodological limitation of this study was that it did not take objective measures of weight loss. Nevertheless, this study contributes to the field of bariatric research and recommends the need for a detailed evaluation of specific psychological processes of change.

In the USA, Forman et al. (2012) examined the efficacy of an acceptance-based behavioural treatment for weight loss in comparison to a SBT. One hundred and twenty-eight participants were randomly assigned to 40 weeks of either ACT or SBT. Both interventions resulted in weight loss but more weight loss occurred in the acceptance-based treatment group, particularly when administered by experts. The results of the study suggested that acceptance-based approaches are helpful for those who are struggling with weight management and have greater levels of depression and engage in emotional eating. This study and the others reported above may be critiqued on the grounds that the authors measured variables via self-report only, which are vulnerable to demand characteristics. This drawback may be overcome by using an implicit measure such as the IRAP. There are no ACT-based intervention studies which use the IRAP, which is a gap in the literature.

In the USA, Katterman et al. (2014) explored the utility of a brief acceptance-based behavioural approach (eight group sessions over 16 weeks) in preventing weight gain in 29 female college students, in comparison to a control group (n = 29). The intervention included weight loss strategies and

acceptance-based techniques. The results included a decrease in weight and body mass index at 16 weeks which was maintained at a one year follow-up, in comparison to the control group who gained weight. Although the authors highlighted the effectiveness of this intervention, they still questioned how it worked and emphasised the need for further research to determine mechanisms of change.

Hill and colleagues (2015) conducted the first case-series study examining the efficacy of an ACT-based intervention in helping two overweight adults with emotional eating. Details of this study provided in the journal paper. However, briefly, post-intervention, there was a reduction in the number of emotional eating episodes. However, a limitation of this study was that it neglected to measure weight post-intervention. Given that one participant was within the morbidly obese category, this oversight may be perceived as negligible due to associated health risks. Generally, it is also unlikely that a participant will initiate treatment with the aim of only increasing psychological flexibility or acceptance, as they may be more interested in how such psychological changes will translate into tangible outcomes.

Regarding the research studies summarised above, ACT appears promising for emotional eating and weight management. Furthermore, the implemented time-frames of interventions varied across studies, ranging from a one day ACT-based workshop (Lillis et al., 2009) to a 40 week acceptance-based behavioural intervention. The majority of studies have been conducted in the USA, with the exception of one conducted in the UK (Tapper et al., 2009). Therefore, the generalisability of the findings are unknown. This highlights the need for exploration of acceptance-based approaches for weight loss/management in a UK sample. All studies measured variables via self-report only, which is open to self-report bias. This drawback may be overcome by using an implicit measure⁷¹. One other drawback is the lack of a measure of emotional eating with items targeting eating in response to positive emotions. Another limitation of studies in this area relates to attrition, indicating the need for an effective intervention in this area.

⁷¹ See section 1.11 on the IRAP.

Furthermore, most studies have utilised RCT methodologies - comparing acceptance based treatment with TAU, as opposed to exploring which parts of the intervention were responsible for change. Therefore, little empirical data is available regarding the mechanisms of change underpinning ACT and further research is advocated in this regard (Gaudiano, 2011; Katterman et al., 2014; Weineland et al., 2012). SCEDs are a viable option in helping to increase understanding about the intricacies of psychotherapy and should be considered alongside RCTs (Barlow & Hersen, 1984). The present study aims to address this gap in the evidence-base by exploring the mechanisms of change underpinning an ACT intervention by adopting a single case methodology.

1.9 A Rationale for Selecting ACT for Emotional Eating and Weight Management

There is an emerging evidence-base supporting ACT as a promising way of addressing the aforementioned clinical problem (Forman et al., 2012; Forman & Butryn, 2015). It is, therefore, important that the efficacy of ACT for this population is examined in more detail. Individuals may resort to emotional eating as a means of avoiding unwanted internal experiences, and struggle because they may lack the psychological tools needed to foster weight management. As highlighted in the journal paper, emotional eating is essentially a form of experiential avoidance. Experiential avoidance may be considered as paradoxical in that avoidance actually results in an increase in the thoughts and feelings which the individual attempts to avoid or dismiss (Geliebter & Aversa, 2003). For example, trying to suppress certain emotions may have a rebound effect resulting in increased emotional eating and experiencing the particular emotions the individual has tried to avoid. This may ultimately result in a vicious cycle whereby the individual experiences emotions they find intolerable, makes efforts to avoid them, which results in both an increase in the unwanted emotion (e.g., guilt, frustration) and engagement in emotional eating (Hilbert & Tuschen-Caffier, 2007; Hill et al., 2015). Furthermore, experiential avoidance is harmful for weight management because one way of avoiding guilt after overeating is to attempt to avoid additional guilt by completely refraining from dieting so as to escape the reminder of “diet failure” (Lillis & Kendra, 2014, p. 4). Experiential avoidance thus serves as a maintaining factor for problematic behaviours such as emotional eating (Lillis, Levin & Hayes, 2011).

It is proposed that ACT may be useful for this population because it aims to help individuals become more accepting and willing to experience uncomfortable inner experiences in order to meet their values (Hayes et al., 1999; Forman & Butryn, 2015). Given that the ACT model places an emphasis on values identification, it enables an individual to clarify their values and make behaviour changes accordingly. Acceptance-based strategies are useful in addressing mindless eating through increasing an individual's awareness and contact with the present moment, thus helping the individual to make informed decisions (Forman & Butryn, 2015; Forman, Butryn, Hofman & Herbert, 2009). Acceptance-based approaches may help those who struggle with emotional eating by uncoupling urge and action and subsequently regulating eating habits (Forman, & Butryn, 2015). Furthermore, long-term weight management requires a commitment to change. Therefore, ACT principles such as "Committed Action" and "values" are useful in helping an individual engage in weight management behaviours (Forman et al., 2009). Other therapeutic approaches to disordered eating (including emotional eating) have been considered limited by ACT advocates due to: (a) failure to focus on experiential avoidance which maintains the behaviour (Orsillo & Batten, 2002); (b) lack of attention to the role of emotional awareness (Zucker et al., 2007); and (c) lack of clarity regarding values (Merwin & Wilson, 2009). However, ACT addresses these gaps and may help tackle emotional eating and subsequently guide better weight management.

1.10 Rationale for How This Research Fits into Wider Trajectory of Intervention Development for this Health Problem

The evidence for ACT is in its early stages and it is striving to prove its value in comparison to other therapeutic models. However, prior to establishing comparative efficacy, ACT needs to demonstrate basic efficacy. In line with the guidance from the Medical Research Council (Craig et al., 2008), this intervention has followed the correct protocol in the process of evidence-building to support its case. Considering that this is a novel intervention with a novel population, a case series design is an appropriate and useful means of assessing feasibility. Initial investigations and exploratory work are required prior to longitudinal definitive trials. This is particularly important considering that the majority of studies focusing on ACT for weight management have been

published in the last decade, and are still in the preliminary phase of identifying ACT as potentially useful in this domain. Understanding more about the reasons why ACT is effective is pertinent to know in order to address the obesity crisis. Therefore, it is important that the mechanisms of change are identified through process mediation, component studies and single case designs like this one. This research, therefore, fits into a wider trajectory by developing a potential tool for this health problem. Craig and colleagues (2008) have recommended that a framework for evaluating interventions to improve health should comprise of both qualitative and quantitative evidence, both of which are a feature of this study.

1.11 Self-help Interventions and ACT

Self-help may be delivered through a variety of formats, including books or online, and is a widely applied treatment modality (Mains & Scogin, 2003). Surprisingly, there is a lack of research regarding the efficacy of such methods, and that which does exist, tends to use a range of formats and populations. This means that the conditions whereby self-help is most effective is unknown (Newman, Erickson, Przeworski & Dzus, 2003).

Self-help approaches have been criticised because of the social isolation associated with self-directed learning (Botella, Garcia-Palacios, Banos & Quero, 2009), and the absence of a responsive therapist (Segal, Williams & Teasdale, 2013). Limitations of self-help approaches include the lack of contact between the client and therapist, and a lack of support for some individuals who may struggle. However, self-help does not necessarily have to be viewed as a compromised format.

There are numerous benefits of self-help approaches, for example, they are relatively inexpensive and resource efficient due to their low intensity (Butryn et al., 2011) and so may make a valuable contribution to addressing emotional eating. They are also accessible and promote self-efficacy (which is considered critical within the common factors literature; Grencavage & Norcross, 1990). Regarding the latter, one argument of employing a self-help approach is that it relies on the individual's drive and so it is a good way of building mastery and self-efficacy allowing the individual to make the necessary changes.

Self-help approaches have also been considered an effective treatment modality (Coull & Morris, 2011; Sysko & Walsh, 2008) with recovery rates comparable to interventions delivered by professionals. For example, in the area of eating disorders, self-help has been found to be effective for binge eating (Bailer et al., 2004; Peterson et al., 2001). Furthermore, in a recent systematic review, fifteen RCTs exploring the effectiveness of self-help acceptance-based approaches were found to be more beneficial than TAU for a range of psychological difficulties (Cavanagh, Strauss, Forder & Jones, 2014). Three ACT self-help books which were included within this review demonstrated positive outcomes. However, on this basis alone, it cannot be concluded that all ACT self-help materials are helpful (Jeffcoat & Hayes, 2012). Furthermore, these studies did not assess the mechanisms of change, so further research is warranted. This is especially important considering that each individual may have a different response to a particular self-help approach, thus making generalisability difficult (Menchola, Arkowitz & Burke, 2007).

Although ACT self-help interventions may not have poor attrition rates, self-help interventions for disordered eating specifically do in comparison, and attrition rates are similar to those offered face-to-face interventions (Winzelberg, Luce & Taylor, 2008). However, briefer interventions have been considered to promote engagement and increase compliance rates with this population (Ghaderi, 2006). Arguably the shame and stigma associated with disordered eating and poor weight management may explain why some individuals may not come forward for treatment, however offering a self-help therapeutic modality may be a way around such obstacles (Garner & Garfinkel, 1997), particularly if it is brief. The evidence regarding guided self-help versus pure self-help is mixed, with some researchers claiming that guided self-help is more effective than self-help alone (Richards & Richardson, 2012). However, the differences between the two modalities have not always been significant (Ghaderi & Scott, 2003).

1.12 SCED

1.12.1 Rationale for adopting a SCED over a RCT. As a means of improving care, therapies supported by RCTs are high on the research agenda (Macey, Clarke & Gologani-Moghaddam, 2015). Due to the negative consequences associated with the obesity epidemic, there is an increased need

to prove the quality and cost-effectiveness of interventions (Petermann & Muller, 2001; Withrow & Alter, 2011; Scarborough et al., 2011). Although RCTs are a good way of confirming the efficacy of ACT, they are limited when it comes to determining individual evaluation and outcome (Davies, Howells & Jones, 2007). Although ACT processes have been considered effective in relieving distress (Hayes, 2004), there is a lack of research exploring how such processes may interact in creating change, how they apply to emotional eating and more broadly weight management. Although previous studies in this area have made important advances (e.g., Lillis et al., 2009; Forman et al., 2012; Katterman et al., 2014), design limitations renders it impossible to determine the mechanisms of change. Moreover, the generalisability of RCTs to other contexts may be challenging, for example, participants recruited to RCTs may not be representative of individuals who suffer with eating and weight-related difficulties (Morley, Williams & Hussain, 2008). In addition to this, although RCTs are used as evidence of efficacy, they do not establish the effectiveness of an intervention (Barkham & Mellor-Clark, 2003).

In order to overcome this limitation, the present study adopted a SCED which lends itself to attribute change to the introduction of the intervention and determine whether or not the ACT self-help intervention impacts on the processes under investigation. This is in line with the research agenda advocating the use of SCED to allow a fuller evaluation of the effectiveness of the ACT model by determining the specific mechanisms of change (e.g., Gaudiano, 2011). This is particularly important as mediational studies are needed to establish whether theorised processes precede changes. Given the novelty of this intervention a case series design is an appropriate and useful means of building evidence.

1.12.2 Benefits of SCEDs. SCEDs involve repeated measurement of the target variable in order to monitor change (Barker, Pistrang & Elliott, 2002). Ultimately SCEDs allow one to establish; (a) whether change has occurred; (b) whether any change is significant and meaningful; (c) whether the change is stable or variable, and; (d) what caused the change (Davies et al., 2007). SCEDs have been considered central to the scientist practitioner model (Jones, 2010) and are an important part of clinical practice for a number of reasons. Firstly, they provide evidence allowing for accountable practice amongst

clinicians (Bloom, Fisher & Orme, 2003). Secondly, they stimulate the generation of new hypotheses, particularly in relation to new interventions (Turpin, 2001). Thirdly, other benefits of SCEDs include the identification of slight changes which may not be picked up in larger studies. Fourthly, SCEDs enable the identification of iatrogenic effects of interventions which is important to inform our learning and practice (Jones, 2007; Davies et al., 2007).

1.13 Implicit Relational Assessment Procedure (IRAP)

A novel feature of this study is the inclusion of the IRAP⁷² (Barnes-Holmes et al., 2006; Barnes-Holmes, Barnes-Holmes, Stewart & Boles, 2010), which is a promising implicit measurement approach. The IRAP is a computer-based task which requires participants to respond to a set of stimuli which is either consistent or inconsistent with their learning history (Nicholson, McCourt & Barnes-Holmes, 2013). The main premise of the IRAP is that respondents give quicker responses when the stimulus and response fit with their beliefs (e.g., “chocolate cake comforts me when feeling stressed”). The IRAP is theoretically underpinned by RFT (Hayes, Barnes-Holmes & Roche, 2001)⁷³.

Emotional eating is typically measured by direct self-report (explicit) measures. In contrast to implicit measurement, currently self-report measures remain the gold standard in assessment for emotional eating (Bongers et al., 2013). However, explicit measurement makes a number of problematic assumptions: (a) cognitions are available to introspection, and that (b) self-reports accurately reflect these underlying cognitions (Greenwald & Banaji, 1995). There is considerable evidence to suggest that – whether due to a lack of awareness or due to secondary cognitions that moderate reporting (e.g., sensitivity to social expectations or social desirability bias) – self-report may be unreliable. The IRAP has the potential benefits associated with implicit forms of assessment. Unlike self-report, implicit measures are not as vulnerable to demand characteristics (Dawson, Barnes-Holmes, Gresswell, Hart & Gore, 2009). This is particularly important for a socially sensitive concept like emotional eating which may evoke shame and be perceived as a stigma in a society striving for thinness (Fazio & Olson, 2003; Annis, Cash & Hrabosky,

⁷² Information relating to the implicit measure is focused on only in the extended paper.

⁷³ See section 1.6.1 for additional information on RFT to avoid duplication.

2004; Puhl & Heuer, 2009). The IRAP has demonstrated its efficacy by measuring behaviours and targeting cognitions not picked up by self-report (McKenna, Barnes-Holmes, Barnes-Holmes & Stewart, 2007). Evidence for this is based on research showing divergent responses to implicit versus explicit measures of the same construct (Power, Barnes-Holmes, Barnes-Holmes & Stewart, 2009).

Furthermore, the IRAP is a comprehensive measure capturing implicit cognition, allowing the exploration of secondary appraisal rather than mere association (Golijani-Moghaddam, Hart & Dawson, 2013). The IRAP is also theoretically consistent with ACT as opposed to other forms of implicit measurement, and so it is a useful means of assessing whether the intervention changes the targeted variables. Within the mainstream cognitive literature, implicit measures are characterised as measuring relatively fast/automatic responses which may occur with reduced awareness or control (e.g., Gawronski & Payne, 2010). Importantly, responses on implicit measures have been shown to predict overt behaviour (McConnell & Leibold, 2001) and potential markers of clinical change (Teachman & Woody, 2003). Implicit responses offer important information given their ability to make predictions about clinically relevant behaviour (Hussey, Thompson, McEnteggart, Barnes-Holmes & Barnes-Holmes, 2015).

The IRAP was selected because it is considered more advanced in comparison to standard implicit measures, such as the Implicit Association Test (IAT, Greenwald, McGhee & Schwartz, 1998) which focuses on associations (Nicholson et al., 2013; Hughes, Barnes-Holmes & De Houwer, 2011). The IRAP is considered to have better content validity in comparison to the IAT as it can assess propositional relations (Golijani-Moghaddam et al., 2013). In comparison to the IAT, the IRAP is considered less susceptible to faking (McKenna et al., 2007). Furthermore, the IRAP has been considered beneficial because it can predict behavioural outcomes (Dawson et al. 2009). Research studies in particular have demonstrated that implicit beliefs assessed via the IRAP impact on behaviour more so than beliefs assessed by explicit measures (Dawson et al., 2009; Nicholson & Barnes-Holmes, 2012).

Although implicit measures capture different information in comparison to their explicit counterparts, it is highlighted that they do not

completely separate automatic and controlled processes (De Houwer, Teige-Mocigemba, Spruyt & Moors, 2009). The Relational Elaboration and Coherence model (REC), which is underpinned by RFT is one explanation for what both types of measures assess (Barnes-Holmes et al., 2010). From a REC model perspective, it is hypothesised that (a) implicit and explicit responses are based at opposite ends of a continuum, rather than being discrete separate processes; (b) implicit measures assess immediate responding, whereas explicit measures assess extended relational processes; and (c) convergence occurs when responses on both implicit and explicit measures are similar (i.e., immediate responses are in line with extended responses), whereas when they are different they are considered as divergent.

Currently, there are no studies in the literature which have used the IRAP specifically in relation to emotional eating, nor as part of a SCED methodology. However, a study examining the effectiveness of an intervention, using the IRAP exists. Hooper, Villatte, Neofotistou, and McHugh, (2010) compared acceptance (mindfulness) and avoidance (thought suppression) approaches to negative emotions. The authors found that the acceptance-based approach led to a change in IRAP responding. However, this study focused on negative responses in particular and there was no focus on emotional eating.

In the remit of emotional eating, explicit measures may be criticised for mainly focusing on negative emotions (which is an oversight considering that individuals may engage in emotional eating in response to positive emotions as well; Nolan, Halperin & Geliebter, 2007). Using an implicit measure may be a way around this. Bongers and colleagues (2013) explored the IAT as a measure of emotional eating, which included positive, negative and neutral words and pictures of food. Participants in this study were then shown a film to assess the impact on their mood before being presented with food. The authors hypothesised that emotional eaters would eat more in the control condition in comparison to those who were not. They found that those who scored higher on emotional eating in response to both positive and negative emotions ate more during the positive mood induction and consumed more than non-emotional eaters. Furthermore, a similar study conducted by Goldstein and colleagues (2014), explored implicit and explicit attitudes to disinhibited eating of chocolate

consumption. They found that a discrepancy between attitudes predicted the amount of chocolate consumed, moderated by impulsivity.

Using implicit measures as an adjunct to explicit measures is useful. Although the efficacy of implicit measures have not been fully established, they are still useful in helping increase our understanding allowing comparisons between both forms of measurement. This is also important because of the issues associated with self-report measures for emotional eating, such as recall bias as individuals may struggle to recall emotions and their eating behaviour, as well as the association between the two (Bongers et al., 2013; Hassan, 2005). Therefore, the measurement of emotional eating suffers from a “triple recall bias” (Evers et al., 2011).

1.14 Further Rationale for the Present Study

This research aims to contribute to the clinical understanding of emotional eating, ACT and the IRAP. Although other research has shown that ACT aids weight management, little is known about how and why ACT works. The present study was considered important to further understanding of the specific mechanisms of change of ACT in addressing emotional eating. This is considered valuable due to the distress suffered by individuals who engage in emotional eating and their struggle with weight management, as well as the clinical implications for assisting those with difficulties in this area. It is also important to obtain an understanding of participants’ experiences of the intervention. However the latter is often neglected in research (Paulson, Everall & Stuart, 2001). Therefore, obtaining views from participants regarding which parts of the intervention they found useful and considered responsible for change is important in increasing understanding. Considering the intervention modality is brief self-help, this also has clinical implications for services in terms of cost (as cheap at the point of delivery), time and resources. This study was also considered important in examining whether an implicit measure may be a useful tool for identifying change in this novel population. Furthermore, this study also has important implications for intervention development as the findings may potentially influence how targeted variables are addressed.

1.15 Sub-aims of This study

Sub-aims which this study set out to explore are outlined in Table 11.

Table 11.

Additional research questions, sources of evidence and hypotheses of the study

| Questions | Sources of evidence | Hypotheses |
|--|---|---|
| Does outcome change? Does emotional eating change following the introduction of an ACT intervention? | Implicit and explicit emotional eating measures. | It is tentatively predicted that the ACT intervention may impact favourably on the implicit measure of emotional eating, and that changes in the implicit measure of emotional eating may be concordant with changes in the explicit measure. |
| Does process change? Do theoretically targeted ACT processes change following the introduction of an ACT intervention? | ACT measure administered on a daily basis. Visual analysis of the graphical representations of data, supplemented with calculations of trend, slope and stability following the guidance by Lane and Gast (2014). | It is hypothesised that the ACT intervention will have resulted in improvements in psychological flexibility as demonstrated by the daily ACT measure. |

2. Extended Method

The design of the study and recruitment process as well as pertinent details relating to the study were discussed in the method section of the journal paper. In this extended section, the epistemological position of the study is covered, along with justification for the sample size and further details relating to the choice of measures. Additional details relating to the procedure and the intervention, as well as ethical issues and the analysis, are also covered in greater depth in this section.

2.1 Epistemological Position

This study sought to investigate the effectiveness of an ACT intervention and explore the specific mechanisms of change underpinning such effects. This study was conducted within a functional contextual framework (Gifford & Hayes, 1999). At the core of functional contextualism is that no experience/event can be distinguished from the context in which it occurs (Morris, 1993). Functional contextualism is underpinned by the principles of realism and parsimony, and is a branch of scientific pragmatism; “truth” is aontological and is determined pragmatically on the basis of the pre-stated goals of a particular analysis. If the analysis allows the prediction of a psychological or behavioural event with precision, depth, and scope, then from a functional contextualist perspective, the analysis is considered “true” in a pragmatic sense (Hayes & Brownstein, 1986; Biglan & Hayes, 1996; Fox, 2006). Given that there is no absolute truth, the goal of analysis is pragmatically determined, and therefore, functional contextualism may be critiqued on the basis that any analysis would be considered “true” (Hayes, 2004). However, drawing on other means of information to inform context may mitigate this limitation. In this study, triangulation was used (Webb et al., 1966). From a functional contextualist philosophical perspective, psychological events may be considered as an interaction between individuals and the context in which the behaviour occurs; the latter which is defined historically (via learning history) and situationally (triggers, consequences, and verbal rules) (Hayes et al. 2004).

Functional contextualism is linked to a theory of language, RFT (Hayes, Barnes-Holmes & Roche, 2001), which underpins both ACT and the IRAP (both key parts of this study and briefly covered in the extended introduction). The

preferred methods of a functional contextualist are quantitative and experimental (Biglan & Hayes, 1996; Gifford & Hayes, 1999; Morris, 1993). Therefore, an experimental design such as a SCED is congruent with this epistemological position; the study of the individual case allows causal inferences to be drawn whilst also considering contextual factors (Biglan, 2004; Kratochwill et al., 2010).

2.2 Rationale for Study Design and Sample Size

Due to the study design, recruiting a total of six participants was sufficient. The sample size was informed by guidance from the What Works Clearinghouse (Kratochwill et al., 2010) recommending at least three replications for SCED (so at least three cases) for sufficient data. The sample size of six was considered feasible within the time period of the study. It also allowed demonstration of replication effects and catered for possible attrition (a potential risk due to the intensive nature of the study whereby completion of daily measures over a six week time frame was required). Nevertheless, low attrition rates were expected on the basis of the sample (a self-selecting bias associated with the recruitment procedure) as well as consultation of the literature regarding self-help. Regarding the latter, a recent systematic review of 15 ACT based self-help studies, found a high level of engagement with two-thirds completing post-intervention measures (Cavanagh et al., 2014). Although, attrition rates for disordered eating are problematic (Treasure et al., 1999), prospective participants were required to contact the researcher if they were interested in finding out more about the study and were provided with details regarding the high intensity of the study before committing to take part; evidence of their potential motivation.

2.3 Overview of Measures

In line with a SCED methodology this study utilised a combination of qualitative and quantitative measures. The measures were selected because they were considered suitable to tap into the area under investigation, were quick to administer due to their length and psychometrically sound. Some additional information relating to the measures not covered in the remit of the journal paper is outlined below. A summary of the measures and the time points of administration are provided in Table 12, followed by a brief rationale for the chosen measures along with a critique in Table 13.

Table 12.

An overview of measures used

| | Frequency | Pre-intervention | | Intervention | | | Post | |
|------------------------------------|-----------|------------------|--------------------|--------------|--------|-----|------|-----------|
| | | Baseline once | Baseline; daily | Daily | Weekly | mid | post | Follow-up |
| Measure* | | | | | | | | |
| Eating Inventory screening measure | | X | | | | X | X | X |
| Six-item emotional eating measure | | X | | | X | X | X | X |
| Record of calorie intake and mood | | | X | X | | | | |
| ACT-specific measures | | X | | | X | X | X | X |
| Daily ACT measure | | | X | X | | | | |
| Change interview | | | | | | | X | |
| Weight | | X | | | | X | X | X |
| IRAP | | X | | | | X | X | X |

*Ranked in order of priority.

Table 13

Rationale for selected measures used along with a critique

| Measure | Rationale for selection | Critique |
|---------------------------------------|--|---|
| Eating Inventory screening measure* | Well established measure, supported in the literature with evidence indicating that individuals who score highly on this measure have poorer outcomes in terms of weight management. This measure has an established cut-off which enables the identification of change over time and also allows assessment of second order change which fits with the ACT rationale. Furthermore, as clients do not seek treatment looking for an increase in psychological flexibility, but a change in outcomes, it is important that an outcome measure such as this is used. | Subject to self-report bias. |
| Emotional eating measure (six items)* | Three emotional eating items in response to negative emotions have been validated and are well established in the literature. Allows assessment of second order change which fits with the ACT rationale. | The three emotional eating items in response to positive emotions have not been validated. However, the development of these items was based on the literature and was important as this area is often neglected. Subject to self-report bias. |
| Record of calorie intake and mood | Selected as a way of assessing the relationship between mood and food consumption (i.e., emotional eating). Having a behavioural measure is necessary in assessing convergence/divergence with self-report measures. | Subject to social desirability bias but given the automaticity associated with emotional eating, this method is considered a more reliable means of assessment, particularly in comparison to asking participants to self-report the number of emotional eating episodes which is more likely to be subject to recall bias. |
| Change interview | Informs context and support data analysis, allowing triangulation. | Subject to self-report bias. However to minimise this, the interview was conducted by an independent rater. |

Table 13.

Continued

| Measure | Rationale for selection | Critique |
|-----------------------|--|--|
| ACT-specific measures | Fits with the ACT rationale whereby process change is expected prior to changes in outcome (emotional eating). Therefore, it is important to assess process in order to determine if the intervention is responsible for change. | A criticism of these measures is that they often measure symptoms as opposed to process and are not well validated. Also subject to social desirability. However, these ACT process measures are the best currently available. |
| Daily ACT measure | Exploratory in order to assess psychological flexibility. | Not yet validated. However, no other alternative measure is currently available. |
| Weight | Interested to examine if weight changes as a result of targeting emotional eating. | However, a big reduction in weight was not expected given the brief duration of the study; nonetheless it is important to have a behavioural measure as this bypasses social desirability. |
| IRAP | Exploratory given that it may potentially assess treatment progress, predict behaviour, and bypass social desirability | IRAP has not been validated for emotional eaters. Research in implicit measurement is very much in its infancy in comparison to explicit measurement. |

Note: *The rationale for choosing emotional eating as the main outcome is as individuals tend to seek help with a specific problem like emotional eating rather than wishing to increase particular ACT processes. Furthermore, this is also an accepted way of evaluating an intervention as clinicians and others will want to know if the intervention was effective in addressing the clinical problem.

2.3.1 Anthropometrics and demographic. BMI was assessed using a stadiometer and a set of clinical weighing scales, which had been previously used in a weight-related research project. A copy of the demographic form is in Appendix A.

2.3.2 Daily ACT measure of psychological flexibility. Based on consensus with research supervisors, the six ACT processes were collapsed into four main components; acceptance; defusion; mindfulness (present moment awareness and self-as-context) and valued living (values and committed action). In developing the daily ACT measure, three items were selected from each of the weekly ACT measures based on factor loadings and face validity (refer to Appendix B). For instance, to measure acceptance three items were taken from the PHLMS, an example item is “I tried to distract myself when I felt unpleasant emotions”. Participants were asked to complete the process measures online daily and the order was randomised to reduce practice effects. The timeframe and format of reminder prompts for completing measures were negotiated with participants. At the time of the present study, a pilot study looking at the psychometric properties of these measures was initiated by another Trainee Clinical Psychologist. The rationale for using the daily ACT measure as the baseline measure (as opposed to an emotional eating measure) was as the focus of the intervention is primarily on ACT-relevant processes (increasing willingness to experience unwanted emotions and behave according to values) versus symptom reduction (emotional eating may reduce as a secondary outcome of changing how participants respond to unwanted emotions).

2.3.3 The Three Factor Eating Questionnaire (TFEQ; De Lauzon et al., 2004). Available measures were differentiated based on their psychometric properties and their general use in the literature. In terms of participant burden, face validity, and simple factor structure – the TFEQ was considered a good choice. The TFEQ is based on (but updates) the original Eating Inventory (Stunkard & Messick, 1985) - in particular, allowing for more of a range of responding on sub-scales (which now include a specific “emotional eating” sub-scale). There are 21- and 18-item versions of the TFEQ, with some recent support for the latter (Cappelleri et al., 2009). Laurenus et al. (2012) have also indicated that the revised TFEQ is responsive to treatment effects. In the

decision process, the Dutch Eating behaviour Questionnaire (DEBQ-R; Van Strien, Frijters, Bergers & Defores, 1986) was also considered as it has a similar structure to the TFEQ-R. However, a decision was made by the researcher to use the emotional eating subscale of the TFEQ-R because it is brief, so reduced participant burden and is freely available. However, as the TFEQ-R18 emotional eating subscale only assesses emotional eating in response to negative, and not positive, emotions, it was decided that it would be necessary to generate items to tap into emotional eating in response to positive emotions (outlined below).

2.3.4 Development of three positive emotional eating items. Due to the lack of available measures assessing eating in response to positive emotions, I decided (with the support of my supervisors) that it would be necessary to develop three items relating to eating in response to positive emotions. The three generated items were grounded in previous literature regarding eating in response to positive situations and states. In particular, both the Emotional Appetite Questionnaire (EMAQ; Geliebter & Aversa, 2003) and Emotional Eating Scale (EES-II; Kenardy, Butler, Carter & Moor, 2003) include “happy” and “relaxed” as items. For parity with items in the TFEQ the decision was made to use the wording “When I am feeling happy”. Furthermore the EMAQ has a “positive situation” item: “When I hear good news”. Therefore, the decision was made to adopt this wording in the generation of a measure assessing eating in response to positive emotions for the purposes of this study.

2.3.5 Eating Inventory (EI; Stunkard & Messick, 1985). In line with the study by Niemeier and colleagues (2012) who used the Internal Disinhibition subscale of the EI as a screening measure, this subscale was used in this present study. Furthermore, this subscale has an established cut-off and is being used in a planned trial comparing ACT and SBT for weight management with emotional eaters (Lillis et al., 2015). Arguably, it is important to keep measures consistent and use a cut-off for emotional eating from the TFEQ. However, the emotional eating subscale of the TFEQ consists only of three items (all of which are eating in response to negative emotions) and so it was queried whether the cut-off was applicable. Therefore, on this basis a decision was made to follow the procedure in the Niemeier et al. (2012) study whereby participants were screened using a longer scale (with a cut-off score of five). In

order to assess change, this measure was re-administered at multiple time points (Kraemer, Wilson, Fairbain & Agras, 2002).

2.3.6 I-PANAS-SF (Kercher, 1992). The brief version of the PANAS has been shown to have some evidence of validity (Mackinnon et al., 1999; Thompson, 2007). Given that participants were required to complete it on a daily basis, it was considered a low intensive option due to having only ten items. Furthermore, the I-PANAS-SF has been used with various temporal instructions and so could be amended to ask participants to report how they felt “today” without compromising its psychometric properties. However, the I-PANAS-SF may be critiqued on the basis that the items are high energy/active and there is no item assessing an individual’s level of happiness. However, it is considered that the overall score of the five positive items reflects this construct (Kercher, 1992). Furthermore, it is a state measure and is widely used (Kercher, 1992; Thompson, 2007).

2.3.7 Myfitnesspal. A decision was made by the researcher to use myfitnesspal on the grounds that it was freely available, widely used, has a reliable reputation, allows confidentiality as it is password protected, and allowed the participant to share their daily entries with myself through an agreed password. Given its electronic format, it is easily accessible for participants who can quickly enter the food they have consumed and the tool will calculate the calories. This saves the participant time from having to look up each food item and calculate the calorie content. This also avoids a false estimation of calorie intake if calculated by participants which is typically underreported (Schoeller, 1995). The tool also allows participants to track their progress facilitating engagement (Burke, Wang & Sevvick, 2011). It was, therefore, considered suitable for use in this study.

2.3.8 Implicit Measure. The journal paper focused on explicit and behavioural measures, here the implicit measure, the IRAP is explored in more detail.

The IRAP (Barnes-Holmes et al., 2006) procedure has been described in detail elsewhere (see Barnes-Holmes et al., 2010; and Hussey et al., 2015). In brief it presents visual stimuli with relational terms such as true, false, same, opposite, and participants are instructed to respond in a particular direction. Different latencies are said to be indicative of some previous learned verbal

behaviour and it demonstrates adequate psychometric properties (see Golijani-Moghaddam et al., 2013; further information provided below).

2.3.8.1 Psychometric properties of the IRAP. A brief summary of the psychometric properties is outlined below.

2.3.8.1.1 Construct validity of the IRAP. Construct validity relates to whether an assessment measures what it claims to measure. Given that implicit cognition cannot be readily observed, it is difficult to determine if it is actually assessed by the IRAP. Therefore, construct validity is dependent on our belief regarding whether what we are measuring actually exists (Sechrest, 2005). On the condition that the construct exists, then both convergent and discriminant validity is necessary in order to estimate construct validity.

2.3.8.1.2 Convergent validity. Measures which are supposed to be related on the same construct and are shown to correlate are said to have convergent validity. The IRAP has demonstrated convergent validity by correlating with explicit measures assessing the same construct (Cullen, Barnes-Holmes et al., 2010; Power et al., 2009), and furthermore with the IAT when assessing the same construct implicitly (Roddy, Stewart & Barnes-Holmes, 2011). However, it is important to note that correlation does not equal causation and just because a measure correlates with another does not mean that the construct is necessarily true. Another means of assessing convergent validity is by examining the differences between groups of individuals who would be hypothesised to score differently. For example, the IRAP has proved effective in examining group differences based on food preferences (Barnes-Holmes, Murtagh, Barnes-Holmes & Stewart, 2011) and sexual preferences amongst sexual offenders (Dawson, Barnes-Holmes, Gresswell, Hart & Gore, 2009).

2.3.8.1.3 Discriminant validity. Discriminant validity is dependent on a measure not making associations. A way of assessing discriminant validity is exploring non-correlational data between constructs considered different. The IRAP appears to bypass social desirability by picking up on different information in comparison to self-report measures (Nosek, Greenwald & Banaji, 2007). This has been found in a number of studies, however, one such example relates to responses on a measure assessing racial stereotyping (Barnes-Holmes et al., 2010). Patterns of divergence have also been reported in the study by Dawson

and colleagues (2009) whereby similar response patterns on the IRAP were found in explicit responses.

2.3.8.1.4 Criterion validity. Criterion validity also referred to as concrete validity is classified when a measure demonstrates its usefulness in strongly relating to other behaviours and constructs. There are two types of criterion validity; concurrent and predictive. Regarding the former, concurrent validity, this is dependent on how well the IRAP correlates with known responses on areas of difference. One example of this relates to examining attitudes towards meat and vegetables amongst vegetarians and non-vegetarians whereby the IRAP found support for the expected beliefs of the two groups (Barnes-Holmes et al., 2010). Predictive validity on the IRAP, in terms of the extent to which it may predict a particular outcome, has been evidenced in a range of studies. For example, in one study assessing participants' fear of spiders, the IRAP has been shown to predict participants' subsequent avoidance of such insects (Nicholson & Barnes-Holmes, 2012).

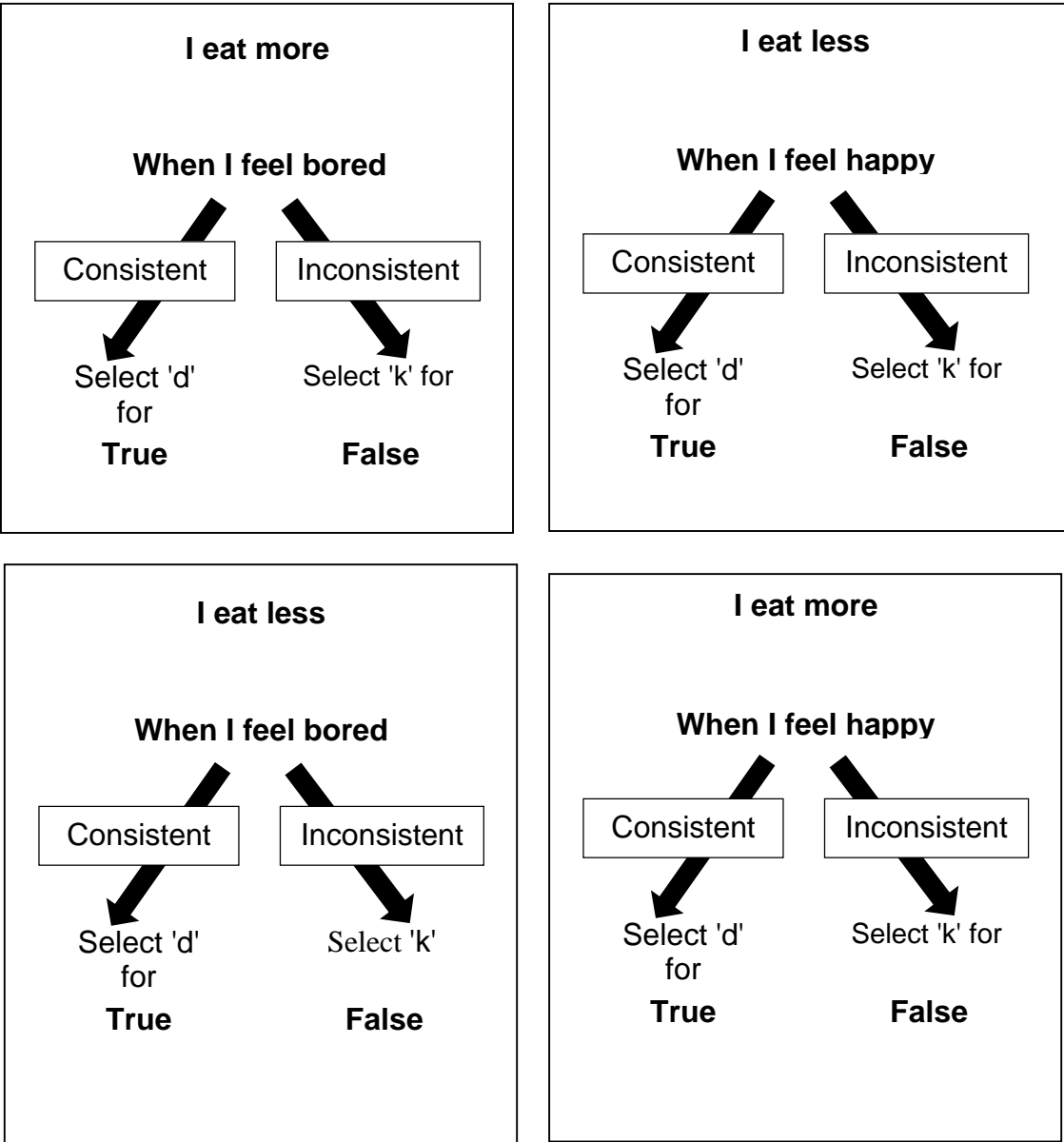
2.3.8.1.5 Face validity. This explores whether a measure assesses what it aims to. As an implicit measure, the IRAP has been considered by experts in the area of implicit measurement as having face validity (LeBel & Paunonen, 2011). However, from a participant perspective, it may be viewed as having poor face validity as although they may be aware of the target being measured, the individual may be uncertain regarding how their responses will be assessed (Golijani-Moghaddam et al., 2013).

2.3.8.1.6 Test re-test reliability. Test retest reliability on the IRAP has been reported as $r = .49$, indicating adequate reliability and stability as the responses have been found to be consistent on two occasions (Cullen et al., 2010).

2.3.8.1.7 Internal consistency. Internal consistency has been reported to range from .23 to .85 (Golijani-Moghaddam et al., 2013). However, generally the reliability of the IRAP is considered limited, this may be due to it being a state rather than a trait measure.

2.3.9 Developing the IRAP. In this study, an IRAP targeting implicit emotional eating was developed on an individual basis; all items were idiographic and based on each participant's key beliefs identified through a stem completion task in the screening process (informed by a literature search and items on an emotional eating questionnaire). Participants were asked to

indicate how much they agreed with each statement and were also asked to generate their own items or belief statements regarding their emotional eating habits, and then rank these in order, from most to least applicable. If the participant reported eating in response to both positive and negative emotions, then the six most highly rated items for both types of emotions were included in the IRAP. If the participant reported eating more in response to one type of emotion (e.g., negative) then the six most highly rated negative items were input into the IRAP along with the six lowest ranked items for eating in response to the opposite type of emotion. Refer to figure 4 for an example of a participant who presented with a stated belief that they ate more in response to negative emotions than in response to positive emotions.



Participants were instructed to follow a rule (e.g., that they eat more in response to either positive or negative emotions) and when the correct response according to the rule was selected by participants, all options were removed from the screen and the options for the next trial were presented. However, if participants selected an incorrect response, a red X appeared on the screen and the participant was only able to proceed when they entered the correct response. Please note the terms “consistent” and “inconsistent” are included here for illustrative purposes and were not presented to participants.

Figure 4: Examples of the Four IRAP Trial Types (idiographic)

Two distinct categories representing the self (“I eat more” or “I eat less”) were presented with the target stimuli; positive and negative emotions. All participants were given the option of true or false on each trial and instructed to follow a rule. Practice blocks were included and were followed by six test blocks. On the first half of the blocks (consistent trials), participants were required to respond in a way that confirmed that they ate more in response to negative emotions but denied their eating in response to positive emotions. On the second half (inconsistent trials), participants were instructed to respond in ways that denied their eating in response to negative emotions but confirmed their eating in response to positive emotions. The test blocks were then alternated between the two types of trials.

2.3.9.1 Considerations taken into account when constructing the IRAP. As noted above, an ideographic approach was taken in constructing the IRAP for each participant, resulting in six individualised IRAPs. Ideographic items adhere to the functional contextualist position because they take into account an individual’s learning history, and so the items represent a more truthful meaning to them. An alternative option may have been to develop two separate IRAP measures, one for emotional eating in response to positive emotions and one for emotional eating in response to negative emotions. However, given the intensive nature of the design with the existing overt measures and the demands of the IRAP task, it was considered best to have one IRAP whereby eating in response to positive and negative emotions could be assessed simultaneously and also serve as the other’s control. This approach was considered best to prevent burdening participants and promote

engagement so as not to compromise the psychometric properties of the implicit measure.

The implications of using positive versus negative emotional eating as contrast categories was considered in supervision, and this decision was considered feasible on the grounds that the scoring of the IRAP would allow participants to demonstrate a range of interpretable response patterns (without assuming that they would only show a bias towards one category of emotional eating). More specifically, this approach enabled participants to endorse: (a) over-eating in response to negative or positive emotions (positive bias for one target stimulus-set); (b) over-eating in response to both negative and positive emotions (positive bias for both target stimulus-sets); (c) no particular contingency between emotions and eating (no bias in either stimulus set); or (d) possible suppression of eating in response to negative/positive emotions (negative biases for one or more stimulus-sets). Another advantage of using negative versus positive emotions as the contrast categories for the IRAP related to accessibility; it was considered easier for participants to follow the rule for each block (e.g., “this time respond as if you only eat more when you feel positive”/ “feel negative”). Given that the contrast categories need to be distinct enough to allow discrimination when responding, the positive and negative variables were considered sufficient for this purpose. As reported above, there were four possible statements in this IRAP. Therefore, participants were required to follow two rules for each trial in that on consistent trials they were instructed to respond as if they ate more when they felt a negative emotion, and so forth.

2.3.9.2 Practice and test instructions. The IRAP was presented on a laptop computer, and administration was in line with guidance stipulated by Barnes-Holmes and colleagues (2010). Task instructions were verbally presented to participants following guidance from the IRAP website (<http://IRAPresearch.org>). Presenting the instructions of the IRAP in a verbal format has been supported by researchers in this field (Hussey & Barnes-Holmes, 2012). It is considered that this helps both comprehension and participant engagement. A script developed by Hussey (2012) was drawn on in this study when delivering the instructions of the task to participants. To facilitate completion of the IRAP, participants were informed that they would be

informed by a red X on the screen if they made an incorrect response and would only be able to proceed when they selected a correct response. Participants were informed that they needed to accurately respond on the test blocks but that they should also do this as quickly as possible. Participants were informed that they should complete this task on their own but that the researcher was on standby should they have any difficulties. Participants were informed that a message would display on the screen when the task was complete asking them to inform the researcher who would then save the file.

2.3.9.3 Rationale for the selected practice criterion and procedure relating to the practice blocks. A threshold of 75% correct responses was set within a response time limit of 2500 ms and participants were required to achieve this on practice trials, of which there were six sets of practice blocks. The rationale for the selected practice criteria followed recommendations from researchers in the field (Barnes-Holmes et al., 2010) and as faster response times do not compromise the reliability and validity of the IRAP (Golijani-Moghaddam et al., 2013). The IRAP assesses participants' first relational response, which is considered to be most accurate representation of their views (Barnes-Holmes et al., 2010). Therefore, the selected response time was considered fit for purpose.

The practice blocks allowed participants to familiarise themselves with the tasks and respond within the required time limits. On completion of the practice blocks, participants were then encouraged to complete the test blocks. This whole process took approximately ten minutes to complete in total. To facilitate engagement, it was agreed that data from practice blocks would be used in the analyses if participants struggled to get past the practice sets.

2.3.9.4 Analysis. The raw data from the IRAP is classed as response latency (reaction time) and derived from the amount of time between presentation of the item and the participant making a correct selection. The raw data for emotional eating in response to positive and negative emotions were transformed into a D measure (referred to as D-IRAP hereafter; Barnes-Holmes et al., 2010). Transforming the response latency data into D-IRAP scores limits confounding factors such as age, motor speed and cognitive ability on latency data (Dawson et al., 2009). The steps taken to make these calculations adhered

to the guidance by Barnes-Holmes et al. (2010), please refer to this paper for detailed guidance.

D-IRAP scores are a way of indicating the response latency between consistent and inconsistent trials. Four separate D-IRAP scores were produced for the four trial types “when I feel (negative emotion) I eat more”; “when I feel (negative emotion) I eat less”; “when I feel (positive emotion) I eat more”; and “when I feel (positive emotion) I eat less”. Mean D-IRAP scores were calculated for “when I feel negative” (IRAP negative) and for “when I feel positive” (IRAP positive). A larger D score was indicative of greater difference in response latencies between trial types. To aid interpretation of the IRAP, reverse scoring was employed whereby positive scores were indicative of eating more and negative scores were indicative of eating less. Scores that were close to zero indicated that there was no discrimination between positive and negative emotions and eating more or less.

2.3.1.0 Change interview. Change interviews allow consideration of contextual factors, obtain participants’ perspective and allow consideration of other possible factors in the change process (Elliott, Slatick & Urman, 2001). A copy of the change interview questions are listed in the journal paper, and a summary of all six participants’ responses are provided in Appendix C.

2.4 Procedure

2.4.1. Recruitment. A copy of the study advertisement sheet is in Appendix D. Advertisements informed individuals to contact the researcher for further information if they were interested in taking part in a study which may help them regulate their eating patterns and subsequent weight management. Monetary compensation was not mentioned in the initial advertisement so as to recruit participants interested in the study and not financially motivated. The sampling strategy consisted of recruiting the first six individuals who met the criteria of the study. Additional individuals who expressed an interest in the study were placed on a waiting list and prospective participants were informed that they would only be invited to take part should any of the initially recruited six participants drop out of the study. This occurred on one occasion whereby a participant who signed up for the study struggled with completion of the measures required in the baseline phase (inconsistently completed over a 22-day period due to problems forgetting and trouble accessing a computer when

her laptop broke). It was agreed that the timing for taking part was not appropriate for this particular participant and they agreed to step down. Another participant from the waiting list was then recruited. Prior to meeting with the researcher, as well as receiving a copy of the information sheet, each participant was also sent 20 self-referential statements regarding their eating habits. The latter formed the stem completion task of the IRAP (see section 2.3.5 to avoid duplication of information here) which allowed the development of the IRAP based on the individual's responses prior to the initial meeting.

2.4.2. Stability in the baseline phase. The guidelines for baseline stability from the What Works Clearinghouse were closely adhered to in this study (Kratochwill et al., 2010). Firstly, enough data points were obtained in order to be able to assess trend/stability. The guidelines suggested at least three data points are required and five is preferred in order to achieve stability. The minimum amount obtained in this study was seven so this requirement was achieved. Another suggestion from the What Works Clearinghouse guidance included making attempts to avoid ending the baseline on an outlying data-point (outlier was defined as having a value higher or lower than [1] baseline mean $\pm 0.5 \times$ baseline mean or [2] baseline median $\pm 0.25 \times$ baseline median).

The above criteria were applied consistently whilst factoring in participant engagement. Therefore, a two stage rule was developed; (a) extend baseline for up to a week if the first week does not show stability/acceptable trend by ideal criteria (e.g., based on present moment awareness items across whole period⁷⁴); (b) use relaxed criteria in second week (e.g., proceed to intervention unless last three consecutive data-points are in the direction of improvement; otherwise continue baseline until value drops for one day). If an upward trend still remained at that stage, the intervention phase started regardless so as not to compromise participant engagement.

2.4.3 Intervention. All participants were provided with a copy of a self-help intervention entitled "The Diet Trap" (Lillis, Dahl & Weineland, 2014). This book was selected based on the recommendation of Professor Steven Hayes (personal communication, 2013; Appendix E) and my research supervisors, as well as a comparative analysis conducted by the researcher (Appendix F).

⁷⁴ The rationale for this is as it is the first clearest process covered in the book.

2.4.4 Comparative analysis. Prior to starting the study available options of ACT self-help books were considered. Following communication with Professor Hayes regarding the general process-focused book, a decision was made to use a more focused text relevant to emotional eating and weight management. Two viable options were considered in depth; “The Weight Escape” (Ciarrochi, Bailey & Harris, 2014) and “The Diet Trap” (Lillis et al., 2014). Both books were read and the pros and cons of each were considered before a decision was made to focus on the latter. The comparative analysis deemed this particular choice as having relative strengths in terms of its accessibility, lower participant burden, discrimination of ACT processes, and focus on ACT versus general nutrition/dietary advice. It was agreed in supervision that the central focus of change should be the ACT processes rather than dietary knowledge, as acquisition of the latter may follow from the former. Therefore, “The Diet Trap” (Lillis et al., 2014) was considered as a compromise between the very general process-focus of “Get out of your mind and into your life” (Hayes & Smith, 2005) book and the highly specific dietary-focus of “The Weight Escape”. The chosen text also included a section on emotional eating, and so it was considered appropriate for the target audience, and therefore, there were no deviations from the original text. The authors provided permission for the book to be used for the purposes of this study (see Appendix G). As reported in the journal paper, participants were required to read assigned chapters which reflected particular ACT processes over a five week period. The author of the book provided confirmation regarding the ACT processes reflected in each chapter.

2.5 Ethical Issues and Ethical Approval

The following ethical issues were considered prior to obtaining ethical approval for the study. Ethical approval was granted from the University of Lincoln SOPREC (see Appendix H for email confirmation of ethical approval). The study obtained favourable opinion with no amendments. The study was conducted in accordance with the ethical principles stipulated by the BPS (2006).

2.5.1 Informed consent. Following screening for eligibility, participants were provided with an information sheet (Appendix I) and given 24 hours to reflect on the study - at which point they were invited to meet with the researcher who went through a paper version of the information sheet and

provided details of the study. Participants were invited to ask questions and seek clarification on anything they were unclear on. Participants were informed that participation was voluntary and they were free to withdraw at any time. Participants were also given the option to remove data up to two weeks following collection at any stage during the study, after which point they were informed that the information provided would remain in the study. Participants were also informed that although they were not obliged to answer all questions during enrolment to the study that if they declined to answer too many of them, they would be released from the study as this would compromise the data. Prior to starting the study it was highlighted to all participants that the evidence for ACT for this clinical problem is in its infancy and may not have any beneficial effects. It was noted that although the current literature has not highlighted any iatrogenic effects, the potential risk cannot be eliminated and so all participants were made aware of this possibility. Participants were then asked if they wished to take part in the study and asked to sign a consent form; one copy of which was kept by the participant and one copy was retained in the study files (Appendix J).

2.5.2. Protection of research participants. On starting the study, participants were provided with the contact details for the student counselling services within the University of Lincoln and information about the eating disorder charity, BEAT (Beating eating disorders). All participants were also informed that they could talk to the researcher if they had any concerns regarding their eating or emotional wellbeing, and were also encouraged to speak to their GP if necessary. In the information sheet, participants were informed that their information would remain confidential but if the researcher had any concerns regarding their emotional wellbeing or any perceived risks relating to their safety or that of others, this would be discussed with her research supervisors and also passed onto the appropriate authorities, if relevant.

Adverse events as a result of participating in this research were not expected. However, possible risks which the researcher was aware of included; participants finding the experience of being weighed embarrassing or mildly distressing or participants finding answering questions about their eating habits upsetting or experiencing emotional discomfort as it was possible that the

intervention may increase their awareness of their eating habits. However, any distress experienced was considered likely to be minimal. Nevertheless, to help minimise such potential risks, a number of safety measures were put in place: (a) from the outset participants were informed explicitly in the information sheet of the possibility of experiencing mild distress associated with a possible increase in awareness of eating behaviour; (b) any weigh-ins or questionnaires were conducted in private or in the presence of the researcher only; (c) participants were only asked to remove their shoes and jacket for the BMI assessment so as to uphold their dignity; (d) participants were given the option of viewing their weight on the scales and asked if they wished to know whether there was an increase/decrease from the previous weigh-in assessment; (e) participants were informed that they could withdraw at any time; and (f) participants were informed that the researcher (a Trainee Clinical Psychologist) was available to offer support; and if required participants would be directed to suitable services should they need additional advice (e.g., counselling services, GP).

As mentioned previously, participants were compensated for the time they invested in the study. Given the intensive nature of the study, it was considered ethically appropriate to reimburse participants for their time. Each of the six participants was provided with £50 in cash after they have completed the post-intervention measures and a further £10 in cash if they completed the assessments at the three month follow-up stage. Participants were informed that should they withdraw from the study part-way through they would not be reimbursed. The rationale for this was as it was hoped that reimbursing participants for their time upon study completion (one instalment of £50 post-intervention and the final instalment of £10 at follow-up) would serve as an incentive to participants to fully complete the intervention and reduce the likelihood of attrition part way through. Given that treatment non-completion may be considered to have adverse effects (McMurrin, Huband & Overton, 2010), this step was considered ethically appropriate. To acknowledge the involvement of participants in the study, the researcher sent them occasional emails thanking them for their participation and acknowledging their contribution in an effort to maintain their momentum in the study.

The needs of the participants were taken into account, in terms of the measures used and the format of the intervention, so as to maintain their engagement. The self-help format and brief nature of the intervention was considered to facilitate engagement. Weekly contact with the researcher allowed participants' needs to be monitored throughout the process, with support offered to those who had any questions or found any part of the process distressing.

2.5.3 Potential risks for researcher and associated risks for the study. This study was not considered to pose any risks to me as a researcher. However, in case any harm occurred, it was agreed that support may be obtained from my research supervisors if required. One potential risk of the study related to attrition, however, to help with this, a decision was made that once data had been provided it would remain in the study if participants did not wish to withdraw it within the two-week window. It was also hoped that reimbursing participants for their time would help counteract potential retention issues.

2.5.4 Confidentiality and data protection. All information obtained for the purposes of the study was treated with confidentiality. This study followed guidance advocated by the Data Protection Act (1998). Participants were required to develop their own identifiable code and password. The identifiable code was used to correspond with their measures and to identify their data in electronic databases. In order to ensure confidentiality, participants who chose to complete their measures online were each assigned a unique link to their set of measures which could only be accessed with the password they devised.

Codes were kept separately from study information to allow confidentiality. The laptop used for data storage and the IRAP was password protected. In line with the Data Protection Act (1998), all data were retained in a lockable filing cabinet and stored at the University of Lincoln. Identifiable data (e.g., consent forms, participant names) were kept separately to anonymised data (measures, interviews, notes). Any electronic data were stored on an encrypted memory stick and on a password protected laptop. Access to the information was limited to the researcher and the administrator of the University of Lincoln (who filed it), but could be viewed by research supervisors and relevant regulatory authorities, if required. All research data will be retained for

seven years following the completion of the study and then destroyed securely in accordance with university procedure. A confidential electronic record of participants' details (e. name, participant number and email address) was created to allow identification for follow-up. After completion of the follow-up phase, this document was destroyed.

2.6 Analysis

Data were analysed using Microsoft Excel software and PASW Statistics Version 18, where appropriate, on a password protected laptop. The analyses sought to investigate the differences between the repeated measures (explicit, implicit and behavioural) as well as draw comparisons between these across time. Response latency data from the IRAP was transformed into D-IRAP scores following guidance by Barnes-Holmes et al. (2010).

2.6.1 Information relating to RCI and CSC. As mentioned in the journal paper, RCI and CSC calculations for the self-report measures was conducted. Here these concepts are briefly defined. Reliable change relates to the degree to which change occurs beyond the probability of variability of the measure, whereas CSC is the clinical cut-off or threshold an individual must cross to reach clinical change (Jacobson & Truax, 1991). Employing RCI and CSC criteria allows participants to be classified into one of four outcomes post-intervention (see Table 14; Davies & Sheldon, 2011). The formulas for calculating RCI and CSC are outlined in Table 15.

Table 14.

Clinical and reliable criteria descriptions

| Possible outcome | Definition |
|---|---|
| Clinically significant improvement; "recovered" | Improvement that achieves both RCI and CSC criteria |
| Reliable improvement; "improved" | Improvement that achieves RCI but not CSC criteria |
| "No change" | Change is within the expected range |
| Reliable deterioration; "deteriorated" | Deterioration that achieves RCI criteria but not CSC |
| Clinically significant deterioration | Deterioration that achieves both RCI and CSC criteria |

Table 15.

*Example of RCI and CSC calculations for illustrative purposes**

| RCI calculations | |
|--|--|
| Standard error of the measurement (SeM): $SD \times (\sqrt{1 - r}) =$ | $0.74 \times (\sqrt{1 - 0.87}) = 0.27$ |
| Standard error of difference (SeDiff): $\sqrt{2} \times (SeM \times SeM) =$ | $\sqrt{2} \times (0.27 \times 0.27) = 0.38$ |
| Reliable Change Index using the formula**: (Post-treatment score – Pre-treatment score) / SeDiff | $(4.5 - 2.5) / 0.38 = 5.26$ |
| For reliable change this figure needs to be greater than ± 1.96 | Yes |
| CSC calculations | |
| (SD functional population x M dysfunctional population) + (SD dysfunctional population x M functional population) / (SD functional population + SD dysfunctional population) | $(0.77 \times 4.08) + (0.74 \times 4.45) / (0.77 + 0.74) =$ $(3.1416) + (3.293) / 1.51 =$ $6.4346 / 1.51 = 4.26$ |
| CSC achieved | Yes |

Note: * Formulas based on Jacobson & Truax (1991); example based on participant 6 pre and post treatment scores on the MAAS. **Positively scored questionnaire as higher scores indicate improvement. If the questionnaire was negatively scored, then the pre-treatment score is subtracted from post-treatment score.

2.6.2 Treatment fidelity check. As mentioned in the journal paper, the researcher conducted a weekly check-in with each participant to assess progress and answer any questions they had. These weekly telephone calls (Appendix K for protocol used as a prompt) were recorded and subset of them were checked for treatment fidelity to the ACT model by Two Trainee Clinical Psychologists. The two raters used a script developed by the author. Results are presented in the journal paper and extended results (section 3.8).

2.6.3 Additional analyses. Trend, slope and stability calculations on daily ACT measure were produced following guidance by Lane and Gast (2014). Graphical depictions of the daily ACT measures were devised and a brief visual analysis was conducted. This method was chosen because graphical display of data may inform the effectiveness of the intervention (Morley & Adams, 1991) and so this information was used to supplement the conclusions drawn in the journal paper in relation to the second research question.

3. Extended Results

The journal paper provided an overview of the main findings of this study, and supplementary information is provided here; for example, information relating to the demographics, the rationale for the norms used as reference data for the RCI and CSC calculations, a detailed interpretation of the IRAP, as well as information relating to the trend, level and stability information for the daily ACT measure. The results of all measures used have also been synthesised and tabulated according to the three research questions for each participant.

Due to following the narrative in the journal paper, the extended results have not been explicitly set out according to the three research questions. However, where relevant, data which related to a particular research question is highlighted in the text.

3.1 Demographics

Table 16 contains the demographic information for the six participants in this study. All were female university students with ages ranging from 19 to 37 years (mean age of 27 years). The length of time for baseline for the six participants ranged from seven to 17 days (mean baseline of 12 days).

Table 16.

Participant demographics

| Participant | Gender | Ethnicity | Age | Occupation | Marital status | Baseline length |
|-------------|--------|---------------|-----|------------|----------------|-----------------|
| 1 | Female | White British | 21 | Student | Single | 7 |
| 2 | Female | White British | 37 | Student | Married | 12 |
| 3 | Female | Black British | 20 | Student | Single | 11 |
| 4 | Female | White British | 36 | Student | Married | 13 |
| 5 | Female | White British | 29 | Student | Married | 14 |
| 6 | Female | White British | 19 | Student | Single | 17 |

3.2 Z score transformation

The calorie intake and positive and negative mood data were converted into z scores following Field's (2013) formula, refer to Table 17 for an example. The purpose of this transformation was to allow both variables on the same metric to ease interpretation.

Table 17.

An example of a z score transformation

| Measure | Score |
|------------------------------|----------|
| Total daily PA | 30 |
| Subtract baseline PA average | 26.47059 |
| | 3.52941 |
| Divide by SD of baseline | 5.658154 |
| z score | 0.623774 |

Note. PA: positive affect; SD: Standard Deviation.

3.3 Reliable and Clinically Significant Change

An overview of the reliable and clinically significant change results are provided in the journal paper. In order to adhere to Jacobson and Truax's (1991) method of calculating CSC and RCI⁷⁵, normative data were required.

To determine CSC, one of three criteria must be met: (a) a post-treatment score must be greater than two standard deviations (SDs) from the mean score of the clinical sample (criteria a); (b) scores must fall within two SDs of the mean of the normal sample (criteria b), or (c) scores must be closer to the normal sample mean than the clinical sample (criteria c). It is important to note that in relation to some of the measures, an ideal comparison sample (defined as most similar to the sample used in the study at hand) would have been an eating disorders sample, given that participants had met the clinical threshold for emotional eating. However, when unavailable, a judgement was made regarding the best available group norms which may be considered equally valid to draw comparisons (e.g., students/community sample).

This decision was also informed by inspecting the mid-point between the available clinical and non-clinical samples and comparing it with the present study sample's pre-intervention mean on each particular measure. The rationale for this was due to the overlap in data (criteria c). A description of the norms used are summarised below for each measure and depicted in Table 18. This information supports the RCI and CSC calculations required to address research questions one and two.

⁷⁵ Refer to Appendix L for RCI and CSC raw data for pre, mid, post, and follow-up for each participant on all of the self-report measures.

3.3.1 PHLMS (Cardaciotto et al., 2008). The acceptance subscale of this measure was used. A decision was made not to use the awareness subscale as the MAAS (also used in this study) is considered as the gold standard measure of mindfulness (Park, Reilly-Spong & Gross, 2013). For the PHLMS scale, the norms for the clinical (eating disorders) and non-clinical (students) sample were derived from the Cardaciotto et al. (2008) study. In order to empirically identify the more relevant reference group, the mean/standard deviation (SD) for PHLMS in the participant sample (pre-intervention) were compared to the means/SDs of the samples from the Cardaciotto et al. (2008) study. The sample's pre-intervention mean scores were also closer to the clinical sample. The decision was made to use the information relating to the eating disorder group and use the clinical alpha, as the sample used in this study closely resembled it.

3.3.2 MAAS (Brown & Ryan, 2003). Examination of the mean pre-intervention MAAS scores for the current sample revealed that the mean was similar to that used in the cancer group (Carlson & Brown, 2005). The sample's pre-intervention mean scores were also closer to the clinical sample. The mean of the sample used in this study is also within two SDs of the mean of the clinical sample. Therefore, the cancer group was used as the clinical reference group. Furthermore, individuals within the cancer sample were significantly higher in emotional distress indicators (comparisons on other measures used in the study) and actively support-seeking (self-referred to stress reduction group), and thus similar to participants in the present study.

3.3.3 ELS (Trompetter et al., 2013). Limited norm reference data were available (possibly as the measure was recently created) so a decision was made to use the information from the Trompetter et al. (2013) study. A community sample was used for the nonclinical norms, and a chronic pain sample was used for the clinical norms reference sample. ELS values of the sample in this study had comparable ELS data to the chronic pain sample. More specifically, the sample's pre-intervention mean scores were also closer to the clinical sample. Therefore, the pain group were used as reference for CSC criterion (using criterion c).

3.3.4 CFQ (Gillanders et al., 2014). There was little research on the CFQ so the norms available from the Gillanders (2014) study were used:

Community/students (non-clinical) and mixed mental health including eating disorders (clinical). The clinical norms were used as it was a closer representation to my sample. Further justification for this decision was as the sample's pre-intervention mean scores were also closer to the clinical sample.

3.3.5 Emotional eating subscale from the TFEQ (eating in response to negative emotions; De Lauzon et al., 2004). The norms provided in the Cappelleri et al. (2009) study were used; overweight females (non-clinical) and obese adults (clinical). The rationale for this choice was two-fold. Firstly, the study by Cappelleri and colleagues used the English language version of this measure which was based on a large/diverse sample. Secondly, the sample's pre-intervention mean scores were also closer to the clinical sample. Therefore, the sample was considered closer to a clinical sample and so that reliability figure was selected.

3.3.6 Emotional eating in response to positive emotions. Given that the three items for the emotional eating measure were created, no reference norms were available and so the data were considered to be reliable if it was within two standard deviations from the mean. The observed alpha, SD, and mean (i.e., from the six participants in this study) were used as the preliminary basis for computing RCI and CSC. The mean and SD of the sample in this study were 2.4; 1.03 respectively.

Table 18.

Overview of reference data

| Measure | Sample M | Criterion C | Population | <u>Clinical norms</u> | | | Population | <u>Non-clinical norms</u> | | |
|-----------------|-------------|----------------|----------------------------|-----------------------|------|-------|---|---------------------------|------|-------|
| | | | | M | SD | Alpha | | M | SD | Alpha |
| PHLMS Accept | 25 | 27.09 | Eating disorders | 22.5 | 8.6 | 0.90 | Students | 30.19 | 5.8 | 0.82 |
| MAAS | 2.93 | 4.26 | Cancer | 4.08 | 0.74 | 0.87 | Community | 4.45 | 0.77 | 0.87 |
| ELS | 50.5 | 56.41 | Chronic pain | 50.90 | 9.81 | 0.91 | Community | 60.8 | 7.8 | 0.90 |
| CFQ | 29.16 | 28.39 | Mixed mental health | 34.3 | 8.06 | 0.88 | Community/students | 22.3 | 8.3 | 0.90 |
| EE negative | 3.38 | 2.05 | Obese males and females | 2.40 | 0.77 | 0.94 | Overweight/obese females from the community | 1.72 | 0.72 | 0.94 |

Note; CFQ: Cognitive Fusion Questionnaire; PHLMS Accept: Philadelphia Mindfulness Scale Acceptance subscale; MAAS: Mindful Attention Awareness Scale; ELS: Engaged Living Scale; EE negative: Emotional eating in response to negative emotions measure; M: mean; SD: Standard Deviation.

3.3.7 Results summary table. A summary of changes for the implicit, explicit and behavioural measures is presented in Table 19. This relates to the first two research questions.

Table 19.

Summary of improvements/deteriorations

| Participant | <u>Process</u> | | | | <u>Outcome</u> | | | | | |
|-------------|----------------|--------------|-------------|--------|----------------|-----------|----------------------|----------|----------------|----------------|
| | Fusion | Acceptance | Mindfulness | Values | Self-report | | Behavioural | Implicit | | |
| | CFQ | PHLMS Accept | MAAS | ELS | EE Neg | EE Pos | Screening measure | Weight | IRAP EE Neg | IRAP EE pos |
| 1 | | | ↑ | | ↑ | | X | X | ✓ | X |
| 2 | ↑ | ↓ | ↑ | | ↓ | | X | X | X | X |
| 3 | ↑ | | | ↑ | ↑ | ↓ | ✓ | ✓ | ✓ | ✓ |
| 4 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ✓ | X | ✓ | ✓ |
| 5 | | | | ↑ | ↓ | ↓ | X | ✓ | X | ✓ |
| 6 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ✓ | ✓ | ✓ | ✓ |

Note: ↓/↑ indicates directionality of Reliable Change; ↓ indicates deterioration away from the desired direction of change; ↑ indicates improvement in the direction of desired change; ✓ indicates improvement; X indicates deterioration. CFQ: Cognitive Fusion Questionnaire; PHLMS Accept: Philadelphia Mindfulness Scale Acceptance subscale; MAAS: Mindful Attention Awareness Scale; ELS: Engaged Living Scale. IRAP Negative: Implicit Relational Assessment Procedure (for eating in response to negative emotions); IRAP Positive: Implicit Relational Assessment Procedure (for eating in response to positive emotions). Empty spaces in the Table are indicative of change that did not meet the threshold for reliable change.

3.4 Implicit Measure of Emotional Eating

A brief overview of implicit changes at an individual level from pre, mid, post, and follow-up are summarised in Table 20, followed by a written example for participant one so as to aid interpretation. This is then followed by a summary comparing implicit and explicit responses. This information relates to the first research question and is additional information not included in the journal paper.

Table 20.

Pre, mid, post and follow-up implicit scores for all participants

| Participant | Time | IRAP | IRAP |
|-------------|------|----------|----------|
| | | Negative | Positive |
| 1 | Pre | 0.59 | 0.34 |
| | Mid | 0.03 | 0.02 |
| | Post | -0.30 | 0.67 |
| | FU | N/A | N/A |
| 2 | Pre | 0.29 | -0.21 |
| | Mid | 0.64 | -0.43 |
| | Post | 0.67 | -0.08 |
| | FU | 0.66 | 0.23 |
| 3 | Pre | 0.48 | -0.64 |
| | Mid | -0.16 | 0.24 |
| | Post | 0.82 | 0.52 |
| | FU | 0.23 | 0.03 |
| 4 | Pre | 0.90 | 0.54 |
| | Mid | 0.88 | 0.34 |
| | Post | -0.12 | 0.52 |
| | FU | -0.76 | 0.16 |
| 5 | Pre | 0.44 | 1.65 |
| | Mid | 0.73 | -0.46 |
| | Post | 0.41 | -0.92 |
| | FU | 0.69 | -0.24 |
| 6 | Pre | -0.28 | -0.23 |
| | Mid | 0.40 | 0.54 |
| | Post | 0.53 | -0.07 |
| | FU | -0.14 | -0.45 |

Note. IRAP Negative: Implicit Relational Assessment Procedure (for eating in response to negative emotions); IRAP Positive: Implicit Relational Assessment Procedure (for eating in response to positive emotions). Plus scores on the IRAP equates with a bias towards eating

more and minus scores equate with a bias towards eating less. The D-score of the IRAP ranges from -2 to + 2. IRAP indicators are; .15: slight, .35: moderate, and .65: strong. If the D-IRAP scores moved closer to zero this was indicative of a reduction in bias towards emotional eating in response to that particular type of emotion. N/A: missing data.

3.4.1 An example of an individual interpretation of the IRAP results.

Pre-intervention, one participant (P1) showed response biases towards eating more in both positive and negative emotional states as indicated by positive scores; at mid-point, this participant showed no response bias (towards eating either more or less) in either emotional state as evident by scores closer to zero; post-intervention, this participant demonstrated a response bias towards eating less when experiencing negative emotions (as indicated by a minus score) but eating more in response to positive emotions (and this latter bias is now more pronounced than at pre-intervention). This participant did not take part in the follow-up stage.

3.4.2 Implicit measure of emotional eating. Participant scores on the IRAP for emotional eating were analysed by considering the D-IRAP scores and overall pattern. On the IRAP negative, improving trends were observed for four participants (P1, P3, P4, and P6) over the course of the intervention. However, a deteriorating trend was found for the remaining two participants (P2 and P5). Participant scores on the IRAP positive indicated trends towards improvement for three participants (P4, P5, and P6) and trends towards deterioration (in terms of eating more) for the remaining three participants (P1, P2, and P3).

3.4.3 Comparison between responses on implicit and explicit measures. There was further evidence of conflictual results, as some participants reported positive changes on the emotional eating self-report measures which were not congruent with the implicit measure. However, changes on the IRAP negative appear to be congruent with changes on the explicit measure for some participants. For example, two participants (P1 and P4) demonstrated a decrease in emotional eating in response to negative emotions on both the implicit and explicit measures at post-intervention. Three participants (P2, P3, and P5) showed an increase in emotional eating in response to negative emotions on both implicit and explicit measures from pre to mid, post and follow-up stages. The remaining participant (P6) showed an

improvement in emotional eating on the explicit measure post-intervention which was incongruent with their implicit measure score. However, the implicit and explicit scores appeared somewhat more consistent at follow-up.

For two participants (P4 and P6) changes in the explicit measures were congruent with changes on the IRAP positive. However, for the remaining four participants (P1, P2, P3, and P5), the implicit and explicit changes for emotional eating in response to positive emotions were inconsistent. For one participant (P1), emotional eating in response to positive emotions reduced on the explicit measure, whereas there was an increase on the implicit measure. For three participants (P2, P3, and P5), there was an increase in the explicit measure of emotional eating in response to positive emotions but a decrease in the implicit measure.

3.5 Trend, level and stability information for the daily ACT measure.

Below is an example of the process for understanding and analysing different observations across the baseline and intervention phases, based on guidance by Lane and Gast (2014). It addresses the key points of trend (direction of the data pattern progress over time), level (considering the data pattern and magnitude of change on the dependent variable), and stability (similarity or variability of scores) (Lane & Gast, 2014). The following example is based on the daily ACT measure for participant one (Figure 5; Tables 21 and 22). This is supplementary information in addressing the second research question. This was followed for every participant on their daily ACT processes and the key information for all participants is summarised in Table 23.

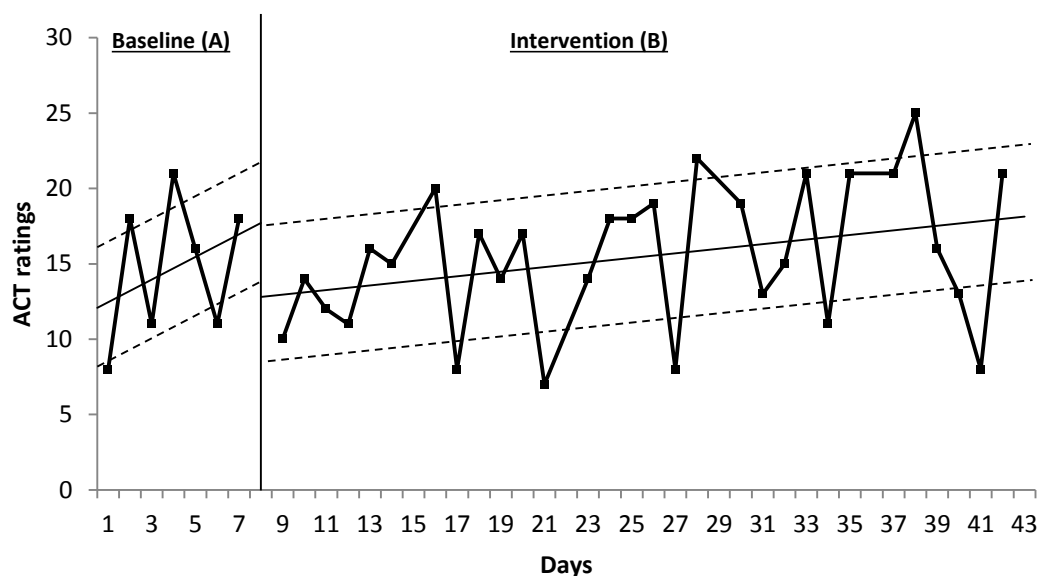


Figure 5. Daily ACT measure for participant one across baseline and intervention phases.

Table 21.

Workings out of trend, level and stability for participant one on the daily ACT measure within phases

| Description | Within | |
|--|--|--|
| | Phase A | Phase B |
| Total number of sessions | 7 | 30 |
| M | 14.7 | 15.5 |
| Mdn | 8, 11, 11, 16, 18, 18, 21 = 16 | 7, 8, 8, 8, 10,11,11,12,13,13,14,14,14,15,15,16,16, 17,17,18,18,19,19,20,21,21,21,21,22,25 = 15.5 |
| Range | 8-21 | 7-25 |
| Stability envelope | $16 \times 0.25 = 4$; so 12-20 | 11.5 – 19.5 |
| % of data points on or within stability envelope | $3/7 = 43\%$ | $16/30 = 53.33\%$ |
| Rel | Median first half: 11; Median second half: 16 = +5 improving | Median first half: 14; Median second half: 19 = +5 improving |
| Abs | first value: 8; last value: 18 = +10 improving | first value: 10; last value: 21 = +11 improving |

Table 21.

Continued

| Description | Phase A | Phase B |
|---------------------------------------|------------------------|------------------------|
| Mid-date for first half | Day 2 | Day 15 |
| Mid-date for second half | Day 6 | Day 30 |
| Mid-rate for first half | 8 | 10 |
| Mid-rate for second half | 18 | 21 |
| % on or within the stability envelope | 3/7 = 43% | 19/30 = 63% |
| Direction | accelerating; variable | accelerating; variable |

Note. M: Mean; Mdn: Median (calculation based on stability around the median as considered a more objective assessment); Mdn: Median level change (median value of intervention minus the median value of baseline). Rel: relative level change (median of first half of intervention minus the median of second half of baseline); Abs: Absolute level change (first value of intervention minus the last value of baseline); mean: mean level change (mean value of intervention minus the mean value of baseline). PND: Percentage of non-overlapping data (highest value of baseline and the number of values above this figure as a percentage); PEM; effect size; (median of baseline and the number of phase B data points that exceed this figure over the total number of observations within phase b and presented as a percentage). Calculations based on guidance by Lane and Gast (2014).

Table 22.

Workings out of trend, level and stability for participant one on the daily ACT measure

| <u>Between</u> | |
|--------------------|--|
| Aspect of analysis | Details |
| Stability | Only one variable changed from baseline to introduction of intervention during the intervention condition. |
| Trend | <p>A change from an accelerating-improving trend in baseline to an accelerating-improving trend during the intervention phase.</p> <ul style="list-style-type: none"> • Condition A: trend direction: accelerating; improving. • Condition B: trend direction: accelerating; improving. • A variable accelerating trend in direction which remained consistent upon the introduction of the intervention. |
| Rel | Median of first half of intervention (B) = 14 minus the median of second half of baseline (A) = 16 equals -2; deteriorating |
| Abs | First value of intervention (B): 10 minus the last value of baseline (A): 18 equals -8, deteriorating. |
| Mdn level change: | Median value of intervention (B): 15.5 minus the median value of baseline (A): 16 equals -0.5, deteriorating. |
| M level change | Mean value of intervention (B): 20.6 minus the mean value of baseline (A): 14.7 equals +5.9, improving. |
| PND | <p>Highest value of A = 21</p> <p>Number of values above 21 = 2</p> <p>Number of values above 21/number of sessions x 100 = 2/30 x 100 = 6.7%</p> |
| POD | <p>Highest value of condition A = 21</p> <p>Number of values the same or below A = 28</p> <p>Number of values on or below 28/number of sessions x 100 = 28/30 x 100 = 93.3%</p> |
| Effect size; PEM | <p>Median of phase A = 16</p> <p>Number of phase B data points that exceed 16 = 13.</p> <p>Value from earlier step divided by the number of observations in phase B; 13/30 = 0.43</p> <p>Multiply value in earlier step by 100; 0.43 x 100 = 43%</p> <p>Therefore, the percentage of data points exceeding the median was 43%.</p> |

Table 22.

Continued

Note; M: Mean; Mdn: Median (calculation based on stability around the median as considered a more objective assessment); Mdn: Median level change (median value of intervention minus the median value of baseline). Rel: relative level change (median of first half of intervention minus the median of second half of baseline); Abs: Absolute level change (first value of intervention minus the last value of baseline); mean: mean level change (mean value of intervention minus the mean value of baseline). PND: Percentage of non-overlapping data (highest value of baseline and the number of values above this figure as a percentage); PEM; effect size; (median of baseline and the number of phase B data points that exceed this figure over the total number of observations within phase b and presented as a percentage). Calculations based on guidance by Lane and Gast (2014).

Table 23.

Trend, level and stability descriptions for participants on the daily ACT measure

| P | Analysis | Level Daily ACT | Trend Daily ACT |
|----------|--------------------------------------|---|--|
| 1 | Within phase A Baseline (7 obs) | Mdn: 16; 43% stable | Variable Accelerating trend |
| | Within phase B Intervention (30 obs) | Mdn:15.5; 53% stable | Variable Accelerating trend |
| | Between | Change: Mdn: -0.5; Rel: -2; Abs: -8; Mean: 5.9; PND: 6.7%; PEM: 43% | An accelerating-improving trend |
| 2 | Within phase A Baseline (12 obs) | Mdn: 38.5; 83% stable | Variable Accelerating trend |
| | Within phase B Intervention (30 obs) | Mdn: 38; 87% stable | Variable Accelerating trend |
| | Between | Change: Mdn: 0.5; Rel: 0; Abs: 14; Mean: 1; PND: 3%; PEM: 36% | An accelerating-improving trend |
| 3 | Within phase A Baseline (11 obs) | Mdn:16; 64% stable | Variable Accelerating trend |
| | Within phase B Intervention (34 obs) | Mdn: 20; 62% stable | Variable Accelerating trend |
| | Between | Change: Mdn: -4; Rel: 1; Abs: 3; Mean: -4; PND: 21%; PEM: 76% | An accelerating-improving trend |
| 4 | Within phase A Baseline (13 obs) | Mdn: 30; 85% stable | Variable decelerating trend |
| | Within phase B Intervention (30 obs) | Mdn: 31.5; 57% stable | Variable Accelerating trend |
| | Between | Change: Mdn: -1.5; Rel: -2; Abs:8; Mean: -1; PND: 20%; PEM: 53% | A decelerating trend in direction which improved upon introduction of the intervention |
| 5 | Within phase A Baseline (14 obs) | Mdn:30; 86% stable | Variable Accelerating trend |
| | Within phase B Intervention (29 obs) | Mdn: 22; 90% stable | Variable Accelerating trend |
| | Between | Change: Mdn: 8; Rel: 8; Abs: 1; Mean: 5; PND: 0%; PEM: 3% | An accelerating improving trend |
| 6 | Within phase A Baseline (17 obs) | Mdn: 26; 82% stable | Variable Accelerating trend |
| | Within phase B Intervention (34 obs) | Mdn: 30; 79% stable | Variable Accelerating trend |

Table 23.

Continued

| P | Analysis | Level Daily ACT | Trend Daily ACT |
|----------|-----------------|--|---------------------------------|
| Between | | Change: Mdn: -4; Rel: -5; Abs: 5; Mean: -3; PND: 0%; PEM: 71% | An accelerating improving trend |

Note: P: Participant number; Obs: number of observations; Mdn: Median (calculation based on stability around the median as considered a more objective assessment); Mdn: Median level change (median value of intervention minus the median value of baseline). Rel: relative level change (median of first half of intervention minus the median of second half of baseline); Abs: Absolute level change (first value of intervention minus the last value of baseline); mean: mean level change (mean value of intervention minus the mean value of baseline). PND: Percentage of non-overlapping data (highest value of baseline and the number of values above this figure as a percentage); PEM; effect size; (median of baseline and the number of phase B data points that exceed this figure over the total number of observations within phase b and presented as a percentage). Calculations based on guidance by Lane and Gast (2014). The desired direction of change has been taken into account, i.e., less calories or less negative affect in the intervention phase in comparison to the baseline phase. Therefore, the signs within the calorie and negative affect sections have been amended to reflect this; minus signs indicate improvement whereas plus signs indicate deterioration (det: deterioration; imp: improvement).

3.5.1 Brief summary of the trend, level and stability data for the daily ACT measure.

The stability envelope was calculated based on stability around the median as this was considered a more objective and accurate assessment with less room for error. The evidence in support of change on the daily ACT measure was weak and variable. Comparisons between stability around the median in the baseline phase and the intervention phase were conducted. The premise for this was based on the hypothesis that psychological flexibility may increase in the intervention phase and be strengthened as participants become more accepting, mindful and aware of their values. Stability around the median decreased from baseline to intervention for three participants (P3, P4, and P6). However, for participants where there was an increase in stability around the median (P1, P2, and P5), improvements were slight. Despite having a low percentage of non-overlapping data and a higher percentage exceeding the median between phases, the changes overall were not considered reliable as a variable accelerating trend was observed in the baseline for some participants. Therefore, these participants were on an upward trajectory on this measure and improving prior to the onset of the intervention. However, on visual inspection there seemed to be an improving trend in approximately week four of the intervention, and this increase may be explained due to an accumulation effect of the ACT processes and socialisation to the model. Refer to Appendix M for daily ACT graphs for each participant.

3.6 Summary of Evidence Relating to Change for Each Participant

In line with a HSCED-informed approach (Elliott, 2002), evidence for and against change was considered on a case-by-case basis in relation to the three research questions (see Table 24 for a summary). To aid interpretation, and demonstrate a reliable replication across cases, a pragmatic cut-off was implemented; replication on a measure for 50% of cases was required to determine efficacy. Application of this cut-off revealed that at least 50% of participants met the threshold for change on the following measures; screening measure of emotional eating (P3, P4, and P6); reduction in weight (P3, P5, and P6); daily ratings of calorie intake and positive mood (P1, P2, P4, and P6) and negative mood (P1, P2, and P3); self-report measure of emotional eating in response to negative emotions (P1, P3, P4, and P6) and in response to positive emotions (P1, P4, and P6); IRAP Negative

(P1, P4, and P6) and IRAP Positive (P3, P5, and P6). In response to the first research question, the evidence suggests that P3, P4, P6 made the most improvements across the mentioned measures. Regarding the ACT process measures at least 50% of participants met the threshold for change on the following measures; present moment awareness (P1, P2, P4, and P6); fusion (P2, P4, and P6) and values (P2, P3, P4, P5, and P6). In answer to the second research question, the evidence suggests that three participants (P2, P4, and P6) made the most improvements on these measures. In answer to the third research question, the evidence suggests that three participants (P1, P4, and P6) demonstrated the most evidence in support of outcome linked to process. Overall, two participants (P4 and P6) demonstrated the most improvements in response to the three research questions, and most importantly evidenced change on the priority measure of emotional eating.

Table 24.

Summary of evidence for and against change

| P. | Evidence | Q.1 Did outcome change? | Q.2 Did process change?* | Q.3 Is outcome linked to process? |
|----|----------|---|--|--|
| 1 | For | <ul style="list-style-type: none"> Reliable improvement on the self-report emotional eating measure in response to negative emotions. Improvement in emotional eating in response to positive emotions (although not deemed reliable). Reduction in emotional eating in response to positive and negative emotions. Change interview report; found ACT helpful in reducing emotional eating and avoidance, and experiences of guilt after eating. Response bias to eating less in response to negative emotions (implicit measure). | <ul style="list-style-type: none"> Reliable improvement on present moment awareness. Change interview report; a change in outlook, clarification of values and an increase in self-awareness and acceptance. | <ul style="list-style-type: none"> Concurrent change on present moment awareness and the emotional eating in response to negative emotions self-report measure. Change interview report; participant classed the intervention as responsible for the changes made. |
| | Against | <ul style="list-style-type: none"> No changes on the screening measure post-intervention. Weight gain post-intervention. Response bias to eating more in response to positive emotions (implicit measure). | <ul style="list-style-type: none"> Slight deterioration (although not reliable) on fusion, acceptance and values. | <ul style="list-style-type: none"> External factors; engaged in the study in the lead up to Christmas and had relationship problems. Participant also injured her knee and was unable to exercise. Participant also rated the researcher favourably. |

Table 24. *Continued**Summary of evidence for and against change*

| P. | Evidence | Q.1 Did outcome change? | Q.2 Did process change?* | Q.3 Is outcome linked to process? |
|----|----------|---|---|--|
| 2 | For | <ul style="list-style-type: none"> Reduction in emotional eating in response to positive and negative emotions. Change interview report; reported an increased awareness of food intake due to ACT. | <ul style="list-style-type: none"> Reliable improvement on present moment awareness and fusion. Change interview report; a change in outlook, clarification of values and self-awareness. | <ul style="list-style-type: none"> Change interview report; participant classed the intervention as responsible for the changes. |
| | Against | <ul style="list-style-type: none"> No changes on screening measure at follow-up. A deterioration in emotional eating in response to positive emotions although changes were not deemed reliable. A reliable deterioration in emotional eating in response to negative emotions. Weight gain at post and follow-up stages. Response bias towards eating more in response to both positive and negative emotional states (implicit measure). | <ul style="list-style-type: none"> Reliable deterioration on acceptance. A slight deterioration (although not reliable) in values. | <ul style="list-style-type: none"> External factors; study ran over the Christmas study period; participant also endured physical illness, academic and familial pressures over the study period. Participant also rated the researcher favourably. |
| 3 | For | <ul style="list-style-type: none"> Reduction in the screening measure at follow-up (no longer meets the criteria as an "emotional eating") | <ul style="list-style-type: none"> At follow-up, reliable improvement on fusion and value measures. | <ul style="list-style-type: none"> Change interview report; participant classed the |

Table 24. *Continued**Summary of evidence for and against change*

| P. | Evidence | Q.1 Did outcome change? | Q.2 Did process change?* | Q.3 Is outcome linked to process? |
|----|----------|---|---|---|
| 4 | Against | <ul style="list-style-type: none"> Reliable improvement in self-report emotional eating measure in response to negative emotions. Reduction in emotional eating in response to negative emotions. Weight loss at post and follow-up stages. Change interview report; found ACT helpful. No response bias towards eating more or less in response to positive emotions (Implicit measure). A reliable deterioration in emotional eating in response to positive emotions self-report measure. No change in emotional eating in response to positive emotions (based on correlations). Response bias towards eating more in response to negative emotions (implicit measure). | <ul style="list-style-type: none"> Change interview report; a change in outlook and a clarification of values in the change interview. | <ul style="list-style-type: none"> intervention as responsible for the changes. External factors; personal issues and was also physically unwell during the study period. Participant also rated the researcher favourably. |
| | For | <ul style="list-style-type: none"> A reduction in the screening measure at follow-up (no longer meets the criteria as an "emotional eater"). | <ul style="list-style-type: none"> Reliable improvements on fusion, acceptance, present moment | <ul style="list-style-type: none"> Evidence of mediation; changes in ACT processes of present moment awareness and values prior to changes in emotional |

Table 24. *Continued**Summary of evidence for and against change*

| P. | Evidence | Q.1 Did outcome change? | Q.2 Did process change?* | Q.3 Is outcome linked to process? |
|----|----------|---|---|---|
| | | <ul style="list-style-type: none"> Reliable improvements in eating in response to both positive and negative emotions. Reduction in emotional eating in response to positive emotions. Change interview report; found ACT helped reduce emotional eating. Response bias towards eating less in response to negative emotions (Implicit measure). | <p>awareness and values at follow-up.</p> <ul style="list-style-type: none"> Change interview report; a change in outlook and clarification of values. | <p>eating in response to negative emotions self-report measure.</p> <ul style="list-style-type: none"> Change interview report; participant classed the intervention as responsible for the changes. |
| | Against | <ul style="list-style-type: none"> No change in emotional eating in response to negative emotions (based on correlations). Although there was a reduction in weight post-intervention, this was not maintained and an overall increase in weight was observed at follow-up. Response bias towards eating more in response to positive emotions (implicit measure). | | <ul style="list-style-type: none"> External factors; changes in her typical eating pattern as her partner cooked meals and there was also a death in the family. Participant also rated the researcher favourably. |
| 5 | For | <ul style="list-style-type: none"> No change in emotional eating in response to positive emotions (based on correlations). Weight loss at post and follow-up stages. | <ul style="list-style-type: none"> Reliable improvement in values at follow-up. | <ul style="list-style-type: none"> Change interview report; participant classed the intervention as responsible for most changes, except weight |

Table 24. *Continued**Summary of evidence for and against change*

| P. | Evidence | Q.1 Did outcome change? | Q.2 Did process change?* | Q.3 Is outcome linked to process? |
|----|----------|--|--|---|
| | Against | <ul style="list-style-type: none"> • Change interview report; increased awareness of food intake due to ACT. • Response bias towards eating less in response to positive emotions (Implicit measure). • Only a slight reduction in the screening measure, participant still meets the criteria as an “emotional eater”. • Reliable deterioration in eating in response to both positive and negative emotions. • No change in emotional eating in response to negative emotions (based on correlations). • Despite the decrease in weight at post and follow-up stages, this participant attributed changes in weight to physical illness during the study period. • Response bias towards eating more in response to negative emotions (implicit measure). | <ul style="list-style-type: none"> • Change interview report; an increase in self-awareness. • Deterioration in other ACT process measures (although not reliable decrements) including fusion, acceptance and present moment awareness. | <ul style="list-style-type: none"> • loss which she attributed to poor physical health during the study period. • External factors; the participant and her baby were physically unwell during the study and her over broke so she relied on takeaway food. Also participant admitted that she did not complete all the activities nor engage in all the exercises. Participant also rated the researcher favourably. |
| 6 | For | <ul style="list-style-type: none"> • Reduction in the screening measure at follow-up (no longer meets the criteria for “emotional eating”). | <ul style="list-style-type: none"> • Reliable improvements on fusion, acceptance, present moment | <ul style="list-style-type: none"> • Evidence of mediation; changes in ACT processes of present moment awareness acceptance |

Table 24. *Continued**Summary of evidence for and against change*

| P. | Evidence | Q.1 Did outcome change? | Q.2 Did process change?* | Q.3 Is outcome linked to process? |
|----|----------|---|---|---|
| | | <ul style="list-style-type: none"> Reliable improvements in eating in response to positive and negative emotions on a self-report measure. Reduction in emotional eating in response to positive emotions. Weight loss at post and follow-up stages. Change interview report; improvement in mood and less self-critical about her clothes size. Response bias towards eating less in response to either emotional state (implicit measure). | awareness and values at follow-up. <ul style="list-style-type: none"> Change interview report; a change in outlook, a clarification of values and an increase in acceptance. | and fusion prior to changes in emotional eating in response to both negative and positive emotions self-report measure. <ul style="list-style-type: none"> Change interview report; participant classed the intervention as responsible for the changes. |
| | Against | <ul style="list-style-type: none"> No change in emotional eating in response to negative emotions (based on correlations). | | <ul style="list-style-type: none"> External factors; academic and family pressures and going on holiday which disrupted her routine. Participant also rated the researcher favourably. |

Note; *The results of the individual processes of the daily ACT measure cannot be accurately reported due to the variability in the response patterns, therefore, data relating to the ACT measure administered at pre, mid, post and follow-up are the focus of this table. The daily ACT measure revealed some variability but an increase in trend overall. It is also noted that the self-report measures administered weekly showed similar temporal resolutions and patterns consistent with the measures administered pre, mid, post and follow-up.

3.7 External events

All participants reported external life events at varying points throughout the course of the intervention. These external factors or extra-therapy life events (Elliott, 2002) were tracked weekly during contact with participants. This information helped inform context and determine if external events may have been responsible for change (Table 25), pertinent to the third research question.

Table 25.

External events recorded for each participant during the study period.

| | P1 | P2 | P3 | P4 | P5 | P6 |
|--------|--|---|--|---|--|------------------------------|
| Week 1 | Physically unwell (Laryngitis), relationship breakup | | Exams | Husband cooking dinners “high in carbohydrates” | Physically unwell (virus) and unable to eat. Caring for child who was also unwell. | Busy with university work |
| Week 2 | Went on holiday | Physically unwell (sick stomach) | Physically unwell (flu) | | Got home late, oven broke, reliant on takeaway food for a few days | |
| Week 3 | Family issue | Busy with family and university | | Death in the family | | Went on holiday |
| Week 4 | Car broke down | Tired from end of university semester | Busy with data collection for dissertation | | | |

Table 25.

Continued

| | P1 | P2 | P3 | P4 | P5 | P6 |
|-----------|--|--|------------------------------------|--|--|----------------------------------|
| Week 5 | Family issues; Run up to Christmas time; Injured knee (unable to exercise) | pressure; Christmas time Christmas | Personal issues; difficult week | Dropped phone down the toilet – delay on questionnaire; attended a free buffet | Returned to work from maternity leave | Busy with university exams |
| Follow-up | | Health concerns | | | Distracted by noise when completing measures | |

Note. Empty spaces in the table represent times when no external factors were brought to the researcher's attention.

3.8 Treatment Fidelity Check

When assessing fidelity to the ACT model, recommendations from the literature were followed (Plumb & Vildargo, 2010), namely the inclusion of two independent raters who were trained in the coding procedure. The training scenario consisted of each rater independently assessing a recording segment before the similarity of codes were compared amongst raters and discrepancies were discussed. This process continued until sufficient reliability was reached, i.e., inter-rater reliability agreement of .80. An inter-rater reliability check was then conducted on 20% of the overall sessions ($n = 6$). The coding proforma and results are outlined in the journal paper.

4. Extended Discussion and Reflections

The main aim of this study was to evaluate whether a brief guided self-help ACT intervention would help individuals who struggled with emotional eating and weight management. This is the first ACT intervention study for emotional eating and weight management through multimodal measurement. For the purposes of the extended discussion, the results of each of the three research questions are synthesised for all six participants, before discussing the relationship between the study findings and existing literature. In this section, the present study is also critiqued, and clinical implications, as well as suggestions for future research, are outlined. Key reflections relating to the research process are also provided.

4.1 Research Question One: Did Outcome Change (Emotional Eating and Weight)?

4.1.1 Synthesis of findings. The variation in scores across measures made interpretation of outcomes difficult. As is common with such designs, participants presented with mixed outcomes by showing improvement on some measures and not on others, or qualitatively reporting changes which were not congruent with the information from quantitative measures (Elliott, 2002). A summary of the findings for each measure is outlined on a case-by-case basis in Table 24 (see extended results). It is important to cautiously interpret the results as the psychometric properties of the measures may have been compromised due to the frequency of administration over the study period.

4.1.2 Screening measure⁷⁶. When participants' scores on the screening measure were compared with responses at follow-up, there were improvements for four participants (P3, P4, P5, and P6) of which three were below the clinical cut-off for emotional eating (P3, P4, and P6). This is a meaningful and valid marker of change in that these participants no longer fulfilled the criteria as "emotional eaters". As reported earlier, there was one participant who dropped out of the study at baseline (prior to starting the intervention). This participant's score of seven at the screening stage is similar to three other participants who took part in this study (P3, P5, and P6). Therefore, there were no apparent

⁷⁶ Priority outcome measure.

differences about this non-completer which may suggest that the intervention was not feasible. However, further inferences cannot be drawn as a stable baseline was not achieved for this non-completer because measures were completed inconsistently. Regarding the individuals who participated in the intervention phase, their findings may be strengthened by consideration of the results of the other self-report measure of emotional eating.

4.1.3 Self-report measure and change interviews. Two participants (P4, P6) had improvements on the self-report measure of emotional eating in response to positive emotions, and four participants (P1, P3, P4, and P6) demonstrated improvements on the emotional eating measure in response to negative emotions. Respectively, two and three participants who improved on the self-report measure in response to both types of emotions had also improved on the screening measure. The change interviews were helpful in establishing the impact of external factors on these results. Commonly, participants reported changes in their eating in response to positive and negative emotions which they attributed to the ACT intervention.

For the two participants who improved on the self-report measure of emotional eating, this may be explained by an increase in self-awareness regarding their concerns. It is possible that the scores on the self-report measures decreased as these individuals learned more about the ACT model, and these scores, therefore, reflect an understanding of what is being measured in combination with increased insight (Sheldon, Clarke & Moghaddam, 2015). However, a positive shift was observed in some of the ACT measures for these two participants between post-intervention and follow-up. The lack of change observed for some participants on the emotional eating measure may relate to the intervention. It may not have been intensive enough or have an adequate amount of therapist contact (Hartmann-Boyce, Johns, Jebb & Aveyard, 2014). Furthermore, the self-report measure had items which related to a desire towards eating rather than the behaviour of eating itself. Therefore, it is possible that the intervention did not influence attitude (Evers et al., 2011); however, ACT aims to help individuals to be more mindful of their urges and respond according to their values (Hayes, 2004). On this basis, it is possible that the desire to eat may have either remained or increased whilst participants responded in line with their values, and such changes were not captured.

4.1.4 Implicit measure. Changes on the implicit measure targeting emotional eating were accompanied by changes on the explicit measure in some cases. In particular, of the four participants who reliably improved on the explicit measure of emotional eating in response to negative emotions, all had similar improvements on the implicit measure in response to this type of emotion. Notably, three of these participants were the same individuals who had improved on the priority outcome (screening measure). However, inconsistencies were observed across implicit and explicit measures when emotional eating in response to positive emotions was assessed. This may be explained by participants' initial reports of eating in response to negative emotions (P1-P5). There was only one participant (P6) who identified eating in response to both positive and negative emotions. Indeed the literature predominantly conceptualises emotional eating as a coping mechanism against stress, boredom, and low mood (Lindeman & Stark, 2001; Van Strien & Ouwens, 2007). Therefore, it is possible that those who did not change were tied up with those particular beliefs (e.g., in relation to thought fusion) which may have resulted in a bias in responding.

4.1.5 Weight and other measures. For three participants (P3, P5, and P6) reductions were observed in weight. Post-intervention, weight loss ranged from 0.9% (P5) to 4.5% (P4). At follow-up, overall weight loss ranged from 1.7% (P5) to 3% (P6). Post-intervention, weight gain ranged from -0.9% (P5) to 3% (P1 and P2). At follow-up, weight gain ranged from 0.8% (P4) to 7% (P2). Lillis et al. (2009) found that those in the ACT group lost 1.6% of their body weight post-intervention and those in the SBT group gained 0.6% in weight. However, the study by Lillis and colleagues explored weight loss maintenance, whereas participants recruited to this study comprised of participants both at the initial and at the maintenance stage.

Furthermore, three participants who lost weight had improvements on the implicit measure for emotional eating in response to positive emotions. Additionally, a pattern was observed on the emotional eating self-report measure in response to negative emotions, whereby two participants (P3 and P6) made reliable improvements but one participant (P5) did not. This evidence fits with the collated contextual information, whereby this participant reported in the change interview that her reduction in weight was due to physical illness

during the course of the study as opposed to the intervention itself. This then raises the possibility that the implicit measure accurately picked up on relevant behaviour in this case.

4.2 Research Question Two: Did The ACT Processes Change?

4.2.1 Synthesis of findings. On balance, there was strong evidence of improvement in ACT processes for the majority of participants, with two participants (P4 and P6) demonstrating the strongest evidence in favour of change as indicated by improvement on all of the process measures. Furthermore, these two participants no longer met the threshold as “emotional eaters”. Considering the ACT processes in line with the three dyads, (a) acceptance and defusion (openness); (b) present moment awareness and self-as-context (awareness); (c) values and committed action (engagement), it is apparent from Table 9 that all measures improved in sequential order of values, present moment awareness, defusion, and acceptance.

4.2.2 Process measures. All participants were deemed to have recovered on at least one ACT process measure. Participants who improved on the fusion and values-based questionnaires were classed as “recovered” in terms of those processes. For the two participants who experienced a reliable deterioration in the explicit measure of emotional eating, there were changes in the ACT processes of mindfulness, fusion and values demonstrating the intervention had an effect. However, this effect did not translate into changes in emotional eating. Therefore, it may be more accurate to state that the intervention worked for some participants some of the time in some of the domains.

4.2.3 Change interviews. The results from the change interviews complemented some of the findings from the quantitative measures, whereby participants also reported increases in their present moment awareness and clarification of their values. Such improvements imply an increase in psychological flexibility, which allowed participants to make decisions based on their values which may have been consistent with reductions in emotional eating.

4.2.4 Daily process measure. A daily ACT measure was employed throughout the intervention phase to examine psychological flexibility and to monitor participants’ responses to the self-help intervention. Results indicated

an upward trend indicating an overall increase in psychological flexibility with a particular increase in approximately week four of the intervention. The increase in week four may be explained by an accumulation of the ACT processes or socialisation to the ACT model and familiarity with items from the daily ACT measure. However, there was some variability in the trend overall as evident by the peaks and troughs over the course of the intervention and an inconsistent pattern across participants. On this basis, it was difficult to accurately interpret findings on this particular measure. This may be explained as; (a) it was a new measure and may have been unreliable in assessing the ACT processes (for example, defusion may be difficult to assess because it refers to the relationship to one's thoughts as opposed to their content; this may account for some of the variability; Gaudiano, Herbert & Hayes, 2010); and (b) the daily administration of the measure may have been unsuitable in capturing psychological flexibility and a longer time period may be needed; or (c) the wording of the measure may have been difficult for some participants to comprehend.

4.3 Research Question Three: Did Outcome (Changes in Emotional Eating or Weight) Link to ACT Processes?

4.3.1 Synthesis of findings. There was some evidence for and against mediation. There was evidence of temporal precedence for four participants, three of whom had improved on the primary outcome of emotional eating. There was no evidence of mediation for the remaining two participants. Mixed evidence of mediation was also found; increases in acceptance in line with emotional eating occurred for two participants, whilst a decrease in acceptance occurred in line with deterioration in emotional eating for one participant. However, there was also an occasion when emotional eating improved without any changes occurring on the acceptance measure, which then questions whether the findings may have been more spontaneous in nature.

Overall, it was difficult to draw comparisons to previous research as very few studies in this area have employed similar measures. For example, defusion has been considered to play a role although this is speculative rather than explicitly measured (Tapper et al., 2009; Moffitt, Binkworth & Nookes Mohr, 2012). Furthermore, although in relation to the clinical problem of social anxiety, a study by Dalrymple and Herbert (2007) found an increase in defusion and

acceptance by mid-point of an ACT intervention resulting in better outcomes overall. However, as a mediator, it was only measured once. The results would have been more reliable if administered at multiple time points (Kraemer et al., 2002), like in this study.

4.3.2 Evidence for mediation. There was evidence that outcome linked to process for some participants, although this was not consistent within individuals, with the exception of one participant (P6) whereby there was strong evidence of mediation, as changes in the ACT processes of present moment awareness, acceptance, values and fusion occurred prior to changes on the self-report measure of emotional eating.

Across individuals, some consistency was evident with the mindfulness measure improving for half of participants (P1, P4, and P6), and this was followed by improvements in the emotional eating measure at either the post-intervention or at the follow-up stage. For two of these participants (P4 and P6), changes on the mindfulness measure were coupled with changes on the acceptance, values and fusion-based questionnaires. For one participant (P3), there were concurrent changes on the fusion and values-based questionnaire alongside improvements in the emotional eating measure in response to negative emotions.

4.3.3 Evidence against mediation and information from change interviews. There was no evidence of mediation on the ACT measures prior to, or alongside, changes on the emotional eating self-report measure for two participants (P2 and P5). For example, at follow-up, one participant (P5) demonstrated a reliable deterioration in emotional eating in response to negative emotions despite recovering on the values-based questionnaire. However, it is possible that this participant may achieve change in the future if reassessed in a longer follow-up. Nevertheless, according to the majority of participants in the present study, the intervention was considered as responsible for the perceived changes. Participants gave high ratings for the intervention in the change interview, all considering the changes as important and reported their surprise regarding these changes.

4.3.4 Alternative explanations. External/contextual factors, the therapeutic alliance or the procedural parts of the study (e.g., self-monitoring) may have influenced the findings (Norcross, 2011; Baker & Kirschenbaum,

1993). Expectancy artefacts may have also played a part in influencing change, whereby participants perceive that if they have changed it must have been due to the intervention and this then becomes a self-fulfilling prophecy (Elliott, 2002).

4.4 Relationship Between Study Findings and Previous Research

The exploratory element of the study, as well as the single case design, is important given that research in this area is in its infancy. There was great variability across measures; although the global assessments of emotional eating demonstrated changes, the day-to-day behavioural information and the implicit measures remained unchanged for some participants. There were also mixed findings in relation to changes in weight loss, with some participants successfully achieving and maintaining weight loss, whilst others' gained weight. However, replication of effect was demonstrated in that three participants no longer met the clinical threshold as "emotional eaters" when the primary outcome measure used for screening was re-administered at follow-up.

The findings from this study may be placed within the context of previous research, whereby ACT has been considered helpful for weight management (Tapper et al., 2009; Lillis et al., 2009; Forman et al., 2012; Katterman et al., 2014; Neimeier et al., 2012). Encouraging preliminary support for ACT in addressing emotional eating has also been found in a small number of studies (Forman et al., 2012; Neimeier et al., 2012; Tapper et al., 2009; Hill et al., 2015). The results of this study expand on previous research studies in this area. In particular, this study extended the research by Hill et al. (2015)⁷⁷ by including (a) a self-report of daily calorie intake and mood; (b) an implicit measure, the IRAP; (c) an objective measure of weight post-intervention and at follow-up; (d) a screening measure to specifically target individuals who struggled with emotional eating; and (e) employment of an ACT self-help intervention modality. Consideration of these factors addressed shortcomings found in both ACT and the weight loss literature.

Previous researchers (Neimeier, Phelan, Fava & Wing, 2007; Niemeier et al., 2012; Butryn et al., 2011; Lillis et al., 2015; Wing & Phelan, 2005) have

⁷⁷ To date this is the only other study which utilised a SCED when exploring the efficacy of ACT for emotional eating.

found that addressing emotional eating resulted in a decrease in weight. This finding is supported in the present study as participants, except one, who had a reduction in their scores on the screening measure of emotional eating lost weight, in comparison to those who remained as “emotional eaters” who subsequently gained weight.

The findings of this study echo the results from the study conducted by Tapper et al. (2009), whereby positive changes in weight were found but the results were not significant. The authors found more changes in those who reported fully applying the ACT techniques. This is important to note given that one participant in the present study (P5) reported that she had not engaged in some of the intervention exercises. Given that completion of exercises and engagement is important in facilitating change (Hirai & Clum, 2008), this may offer some explanation in the lack of improvement in emotional eating for this participant. Generally, there were high completion rates of both the intervention and the associated exercises. However, this may have been due to social reinforcement from the weekly check-ins with the researcher, as guided self-help is considered better than pure self-help (Richards & Richardson, 2012). Although participants were asked whether they completed the self-help intervention during the check-in process and how they found the chapter(s); enquiring alone may have been insufficient. Therefore, better monitoring of whether participants have applied the skills that they have learned is required. This would then allow firmer inferences to be drawn regarding the helpfulness of this intervention.

Katterman et al. (2014) similarly recruited female college students. However, they found significant changes in weight in those who completed the ACT-based intervention, and these changes were maintained at a follow-up of one year. These results differ from the present study. Katterman and colleagues had the longest follow-up period to date of all of the ACT RCT studies investigating weight loss (Jinks et al., under review). Given that the follow-up in this study was brief at three months, a longer follow-up may have resulted in more positive changes in emotional eating and weight reductions considering that eating patterns are typically well established and so change may require a longer time period.

The results of the present study were not entirely comparable with the findings from previous research. For example, Lillis et al. (2009) found that a brief ACT intervention resulted in more weight loss in comparison to a control condition. However, these findings may be contaminated by the fact that participants in the ACT group had previously received a SBT. Therefore, it is questionable whether the findings were due to ACT or an accumulation effect resulting from the combination of both interventions. Furthermore, the intervention in the Lillis et al. (2009) study was delivered face-face, and so the fact that it was not guided self-help may explain the differences in comparison to this study.

Likewise in the study by Forman and colleagues (2012), individuals who received the ACT intervention lost more weight in comparison to those in the control condition. However, the ACT intervention was delivered alongside a SBT which may have skewed the findings. Given that SBT have demonstrated their effectiveness in the initial stages of weight loss, showing modest short-term success but poorer outcomes in the long-term (Castelnuovo & Simpson, 2011; Wadden, Webb, Moran & Bailer, 1996; Wilson & Brownell, 2002; Booth et al., 2014), there is a clinical need for an intervention that will result in maintenance of treatment gain.

It is still possible that ACT may fill this gap, even though the findings of the present study revealed a mixed picture, in terms of efficacy. It is likely that the intervention itself did not have a “strong” enough effect in creating change across all participants or it was not fully comprehensive in catering for other factors which contributed to poor weight management. Given that SBT have been criticised due to the limited evidence supporting cognitive mediators of change (Longmore & Worell, 2007), and the lack of poor reporting of theory in some cases (Booth, Prevost, Wright & Gulliford, 2014), ACT may be useful as it has an identified mechanism of change (psychological flexibility), although further research is required. One way forward may be to encourage mindful awareness of thoughts with a focus on living according to one’s values, rather than narrowly considering calorie consumption and exercise (Forman & Butryn, 2015). Therefore, combining ACT as an adjunct to SBT intervention approaches may be a way forward (Jinks, Moghaddam, Dawson & Rennoldson, under review).

Forman and colleagues (2012) found more weight loss when the ACT intervention was delivered by experts in comparison to those who were relatively less experienced; this highlights the importance of therapist experience in the role in delivery. Considering how the ‘guided’ element of the intervention was administered by a Trainee Clinical Psychologist with less experience than a qualified ACT practitioner this may explain the lack of changes for some participants (Stein & Lambert, 1995; Messer & Wampold, 2002). Another explanation for the poor outcome in emotional eating may relate to the intervention modality. Arguably self-help is the “weakest dose” of treatment, and notably, previous research has indicated that higher levels of therapist input produces better outcomes (Butryn et al., 2012; Hirai & Clum, 2006; Menchola, Arkowitz & Burke, 2007; Hartmann-Boyce et al., 2014). This would also fit with Sysko and Walsh (2008) who highlighted that self-help is only considered as a better option for disordered eating when no other treatment option was available.

Another explanation for the lack of improvements in emotional eating in some cases may relate to participants having difficulty comprehending the wording of the questionnaires due to an initial lack of familiarity with ACT. It is possible that some of the changes may be explained by increases in participants’ level of understanding as they become more socialised to the ACT model (Sheldon et al., 2015). For example, ACT jargon relating to “acceptance” may be initially misinterpreted as “resignation”, however, once introduced to ACT, participants may view this concept differently. This may account for the variability in scoring and the difficulty finding consistent patterns.

It is also possible that participants may have found the content of the intervention difficult to understand and this may have influenced the findings. Despite participants claiming in the change interview that the book was accessible, such responses may have been biased due to impression management (Nosek, Greenwald & Banaji, 2007). Participants worked through a self-help ACT book and checked-in with the researcher if they were unsure about some of the content, a similar process occurred in another study by Johnston et al. (2010). It is, therefore, possible that therapist contact may have influenced participants understanding of the book. This may mean that a guided element, as provided in the present study, is necessary to facilitate

understanding of the book; this may have implications for rolling the intervention out as pure self-help.

Given that approximately 10% of clients deteriorate as a result of treatment (Lambert & Ogles, 2004), with even higher rates in routine practice (Hansen, Lambert & Forman, 2002), the possibility of the iatrogenic effects of the intervention require consideration. This is particularly important as there were reliable deteriorations in emotional eating for two participants. This raises the question regarding what may be classed as iatrogenic in this study, and if we should be offering ACT if it is not effective. The iatrogenic effects of the intervention are dependent on how the problem is functionally defined from a participant perspective. For example, if weight loss is considered important then weight gain would be classed as an iatrogenic effect. However, if the individual's goal related to improving mood, and their distress plummeted but the individual gained weight and found this acceptable, then this is not an iatrogenic effect. Although it is possible that some participants may be on a negative trajectory prior to starting treatment (Lambert, 2013), the inclusion of a functional analysis or a goal attainment scale in future studies would help clarify the efficacy of ACT.

Nevertheless, this study found improvements in the ACT process measures for participants; this is in line with what the ACT model hypothesises (Hayes, 2004; Harris, 2006). From an ACT perspective, the aim is not symptom reduction but an increase in psychological flexibility (Harris, 2009) in order to achieve second order change, i.e., changing the responses (e.g., eating) to the emotions rather than the emotions themselves (Hayes, 2004). Therefore, this study achieved this objective. It is hoped that symptom reduction may occur as a secondary outcome, but it is not a prerequisite of ACT (Harris, 2009). Given the mixed findings regarding symptom reduction, these results are disappointing as in real life clinical practice, clients tend to request help with a problem wishing to see a tangible change in outcome. It is possible that increasing psychological flexibility may shift symptoms in the long-term, and therefore, the short follow-up period in this study may have been too brief in this respect.

The results of this study make a valuable contribution to weight loss research as the underlying mechanisms of change are largely unknown (Byrne, 2002; Gaudiano, 2011). Despite ACT proponents highlighting that a benefit of

ACT over CBT is its focus on processes of change, very few ACT intervention studies exist in this respect, and those that do, lack reliable measures. This limitation has been recognised by ACT advocates calling for more SCEDs with a focus on process and the mechanism of change (Guadiano, 2011).

Improvements in the explicit emotional eating measure were mediated by changes in present moment awareness, confirming previous research in support of a mindfulness-based intervention in aiding weight loss (Butryn & Forman, 2015; Moon & Berenbaum, 2009; Timmerman & Brown, 2012). The results from this study provide support and an additional rationale for incorporating metacognitive awareness into weight management programmes to aid potentially healthier decision-making (Metcalf & Mischel, 1999; Forman & Butryn, 2015) and increase dietary restraint (Ward & Mann, 2000). Mindfulness may help individuals who struggle with emotional eating and weight management to be more aware of their diet and physical activity and adapt their behaviour accordingly (Kristeller, 2003; Godsey, 2013). An increase in present moment awareness is likely to enhance monitoring which may help adherence to responding in accordance with one's values but also aid emotional-regulation (Baumeister, Heatherton & Tice 1994; Hill & Updegraff, 2012). Mindfulness is also associated with greater self-control (Bowlin & Baer, 2012). Given that dieting may be regarded as an aversive experience by some individuals (due to the associated discomfort), mindfulness may equip individuals with the skills needed to overcome the associated distress (Roberts & Danoff-Burg, 2010).

However, it is possible that the positive changes in present moment awareness may have been a result of an accumulation effect of other ACT processes covered in the previous chapters, rather than this specific process alone. Given that the processes overlapped in the chapters, as confirmed by the authors, this is a strong possibility. For example, there was some evidence that values and cognitive fusion may serve as a mediator of change. Previously such a finding has only been speculated in the literature (e.g. Tapper et al., 2009). This study also provided some evidence that changes in the levels of acceptance of negative thoughts and feelings mediated the effect of the treatment on weight loss (Gifford & Lillis, 2009; Lillis et al., 2009). This has important implications for interventions in this area as it suggests that present moment awareness, values, acceptance and cognitive fusion could be explicitly

targeted, and interventions could be refined accordingly. However, more research is required to investigate this further.

There are no single case studies focused on emotional eating which have similar findings regarding temporal precedence of ACT processes. Some similarities were found by Hill and colleagues (2015), however, comparative measures were not used which limits evaluation. Furthermore, Hayes and colleagues (2013) have highlighted that nearly 24 studies exist incorporating mediational analyses. Helpful mediators of ACT include general measures of acceptance or some variant of it (e.g., food/weight/activity-related acceptance) and psychological flexibility (Gifford et al., 2004; Lillis et al., 2009; Forman et al., 2012; Katterman et al., 2014; Tapper et al., 2009), defusion (Gaudiano & Herbert, 2006; Hayes et al., 2004; Varra, Hayes, Roget & Fisher, 2008), awareness (Butryn, Forman, Hofman, Shaw & Juarascio, 2011), and values (Lundgren, Dahl & Hayes, 2008).

One study in particular by Forman and colleagues (2009) found evidence to support the mediating role of food-related acceptance in those who scored highly for emotional eating, however, these findings did not apply to those who did not meet the threshold for emotional eating. This suggests that targeting ACT processes may be particularly useful for this clinical subgroup as this may result in more significant improvements in weight management. However, the quality of the evidence on mediation may be criticised, as some studies determined mediation based on the processes being measured concurrently with outcome (Gifford et al., 2004). Furthermore, these studies were mostly correlational and cross-sectional, relying on self-report process measures. Instead, behavioural or observational measures may have allowed stronger conclusions to be inferred (Hayes et al., 2006). Some studies also neglected to check fidelity to the model, and therefore, change could be due to common factors such as placebo effects, therapeutic rapport or therapist competence (Grencavage & Norcross, 1990; Messer & Wampold, 2001).

The strength of the present study was the inclusion of multiple measures, however, this also lends itself to difficulties in interpretation of multiple outcomes. Although the screening measure of emotional eating was selected as the primary outcome given that it is widely used in research and has a clinical cut-off (Neimeier et al., 2012; Butryn et al., 2011), other measures (self-report,

implicit, day-by-day behavioural; interview) may be viewed as most important depending on the chosen focus. From a public health, behavioural and client perspective, tangible outcomes such as changes in eating patterns and weight may be classed as most important and indicative of change. However, from an ACT perspective, the ACT processes underlie behaviour, and are considered most important as they are what ACT primarily sets out to intentionally change by increasing psychological flexibility (Harris, 2009). This raises some important questions; is it always the values-consistent target which individuals should change? If participants report that they found the intervention helpful, should that suffice? ACT proponents may argue that increasing value-consistent living and helping individuals feel more content may be the ultimate indicator of success but for others, the aim may be behavioural changes, understandably so, due to the adverse health consequences associated with obesity (Caballero, 2007).

There was evidence of desynchrony as some participants reported positive changes on emotional eating self-report measures which were not congruent with the implicit measure. A possible explanation for the divergence in the findings for the implicit and explicit responses may be attributed to the differences in relational responding (Barnes-Holmes et al., 2010). For example, it is likely that brief and immediate relational responding occurred when participants completed the IRAP which reflected frequent relations in comparison to extended relational responding which occurred when participants completed the explicit measures (Barnes-Holmes et al., 2010). The latter may result in reappraisal of particular relational frames (e.g., eating in response to positive emotions). Although it is unclear why this would be the case, there are a number of possible explanations. First, it may relate to impression management whereby participants were worried about the researcher's reaction or perception of their responses. Second, it may be due to poor validity or reliability of the implicit measure resulting in disparate findings due to a failure to pick up on important information.

Another explanation is that implicit and explicit measures may represent distinct mental constructs that do not interact or overlap, in that implicit are automatic in comparison to explicit which require conscious thought (Greenwald & Banaji, 1995; Greenwald & Nosek, 2008). Therefore, the variability may be

explained as participants were not fully aware when self-reporting but the implicit measure captured additional information (Wilson, Lindsey & Schooler, 2000; Greenwald & Banaji, 1995). In contrast to this, there has been controversy in the literature with some researchers proposing that implicit and explicit measures are on a continuum from automatic to non-automatic thoughts and so are interlinked and not structurally distinct (Hughes, Barnes-Holmes & Houwer, 2011; Fazio & Olson, 2003).

However, given how implicit responses may predict and guide engagement in particular behaviours (Dovidio, Kawakami & Gaertner, 2002; Hugenberg & Bodenhausen, 2003), the findings from this study are important. For participants whose implicit responses remained unchanged by the intervention, it is important to note that there are studies in the literature (e.g., see Carpenter, Martinez, Vadhan, Barnes-Holmes & Nunes, 2012; Nock et al., 2010) highlighting that unchanged responses may be predictive of relapse or worse outcome at follow-up. Arguably, for those whose scores changed on both implicit and explicit measures, this may be considered stronger evidence of a comprehensive change and more predictive of behaviour given that implicit responses are harder to control in terms of social desirability (Fazio & Olsen, 2003; McGregor & Marigold, 2003). However, considering that the evidence-base for implicit measurement is in its infancy relative to explicit measurement (Bongers et al., 2013), further research is required before firmer conclusions may be inferred.

On balance, according to this study a brief guided ACT self-help intervention may have some benefits in reducing emotional eating but does not provide sufficient support for all participants.

4.5 Critique of This Study and Directions for Future Research

A critique of the study is outlined in the journal paper. A more detailed discussion of the strengths and limitations of the study are outlined below, along with suggestions for future research.

4.5.1 Characteristics of the sample. On enrolment to the study, all participants met the clinical threshold for emotional eating, providing some generalisability to other individuals who engage in this behaviour. The eligibility criteria, in line with most weight management studies to date, focused on participants with a BMI of 25 or above. This helped bypass some of the

potential ethical issues associated with recruiting participants with a BMI within a normal or underweight range. Physical and mental health risks associated with being overweight or obese may be viewed on a continuum, allowing a more realistic estimate of issues for participants (Hubbard, 2000; Wilson, D'Agostino, Sullivan, Parise & Kannel, 2002).

However, the present study was unable to recruit a more heterogeneous sample, as recommended by Niemeier et al. (2012). Despite taking steps to recruit both males and females to this study, only females came forward within the recruitment period. Studies in this area would benefit from recruiting males to examine if there were any differences amongst gender and allow more generalisability of the findings. This is particularly important given that the research to date has indicated that emotional eating is less prevalent in males (Provencher et al., 2003).

Nevertheless, the sample within this study, the majority of whom were Caucasian females, is comparable and seems to be representative of participants generally in weight loss research (Lillis et al., 2009; Burke et al., 2011). Furthermore, given that young adult women have an increased likelihood of gaining weight (Katterman et al., 2014; Levitsky, Garay, Nausbaum, Neighbors & Della Valle, 2006; Nelson, Story, Larsen, Neumark Sztainer & Lythe, 2008), and there is a lack of intervention studies in particular for overweight college students (Elben & Lissner, 2006), this study addressed a niche in the literature.

4.5.2 Measures. The I-PANAS-SF (Kercher, 1992), may be critiqued on the basis that it does not cover everyday feelings, like content/happy, but instead focuses on feelings of high activity. It is possible that the longer version of this measure would have been more appropriate but this may have affected participants' engagement, given the sheer amount of measures they were asked to complete. Nevertheless, the I-PANAS-SF is a widely used measure of mood, and therefore, allows comparisons with other studies (Kercher, 1992).

Due to the lack of available measures assessing emotional eating in response to positive emotions, a measure comprised of three items was created, the process of which was guided by the literature, allowing assessment into a neglected area. However, the lack of validation of this measure may be problematic. A similar critique relates to the daily ACT measure whereby items

from a selection of validated measures were extracted and agreed in consultation with my supervisors and two fellow Trainee Clinical Psychologist peers. Although face valid, the psychometric properties of this measure are unknown.

BMI was objectively measured and did not rely on self-report which may have been subject to error, even though it is a commonly used method in research on weight loss (e.g., Hays & Roberts, 2008). All of the self-report measures employed were subject to social desirability bias (Hassan, 2005), as was the change interview. Regarding the latter, participants were aware that the researcher had designed the study and so the qualitative responses may have been censored due to the researcher unintentionally conveying her expectation of the participant and hopes for the study (Orne, 1962). For the change interview, to limit bias this was conducted by a fellow Trainee Clinical Psychologist, however, participants were made aware that the researcher would hear the recording afterwards which may have resulted in participants censoring their feedback. Although not feasible due to time and resource constraints for this Clinical Doctorate Thesis, this issue may have been navigated by having different researchers involved in distinct stages of the process.

The IRAP was used as an exploratory measure which may override demand characteristics. However, any inferences regarding the IRAP and explicit measures may actually reflect error in how implicit beliefs are measured (refer to Golijani-Moghaddam et al., 2013 for a critique of the IRAP). The implicit measures were developed on an idiographic basis and so arguably were a stronger reflection of participants' beliefs in comparison to the self-report questionnaires as they were tailored to each individual. Given that implicit measures are considered predictive of behaviour (Nock et al., 2010), they capture additional information in the field of emotional eating which may be useful in informing our knowledge in this area. The inclusion of an implicit measure is particularly important considering how assessing emotional eating has been considered as "mission impossible" (Evers et al., 2011). This is as emotional eating scales tend to capture participants' attitudes towards emotions and eating, as opposed to being reflective of their food intake (Evers et al., 2011). Future research would also benefit from further exploration of the IRAP in more detail with individuals who are overweight/obese and engage in

emotional eating. This is important as it would help confirm/disconfirm whether the IRAP captures unique information. If this was the case, it may have useful implications for informing practice, particularly if it captured information unavailable to self-report and was predictive of engagement in this type of eating behaviour.

Another advantage of the present study was the inclusion of psychometrically sound measures which have not previously been combined in one study exploring this clinical problem. This study also adhered to the recommendation from Öst (2014) in using valid and reliable outcomes, whilst considering those which were specific (emotional eating) along with ACT-specific process measures. The inclusion of both qualitative and quantitative data served to inform context and enabled triangulation (Webb, Campbell, Schwartz & Sechrest, 1966). This is the first study to employ an implicit measure of emotional eating in combination with self-report measures of emotional eating and an objective measure of weight, and therefore, contributes new knowledge to this area through the unique combination of measures employed. This also means that comparisons may be drawn in the future. It is noted, however, that some of the strengths of the design in terms of employing a range of measures presented with difficulties in interpretation. The option of using narrow measurement and a few measurement occasions may have simplified the analysis process but it would have jeopardised capturing important information. Furthermore, all variables were measured at multiple time points, which enabled a detailed examination of process over time, thus adhering to the call made by Guadiano (2011). Furthermore, although the design was intensive, the results reflect real life practice whereby it can often be difficult to determine the findings for clients (Elliott, 2002). Future research needs to explore the strengths and limitations of measures so as to understand which measure is most meaningful and indicative of capturing change, and so further investigation is needed.

4.5.3 Procedure. The present study makes a useful contribution to the existing research in this field. As a SCED, it is methodologically robust and ecologically-valid. Although a minimum of three participants are required for a SCED as advised by the What Works Clearinghouse (Kratochwill et al., 2010), six individuals were recruited into this study which allowed more inferences to

be drawn. Support was obtained as the starting point for each participant was staggered highlighting that change occurred following the introduction of the intervention. Varying baseline lengths is also the ideal for single case research and this was achieved in this study (Kratochwill et al., 2010). These initial findings are likely to serve as a platform for development of future research in the area of emotional eating, and particularly help inform investigation of this ACT intervention in a larger trial in the future, although more research is warranted prior to this. Furthermore, this study examined the short-term effects of an ACT intervention and future studies may benefit from employing a longitudinal design which would allow examination of whether any changes in emotional eating occurred over a longer time period.

Evidence that the intervention was well received included the positive self-reports and ratings from participants, as well as the zero attrition rate from the intervention stage. Given the high intensity of the study, whereby participants were asked to complete daily measures over approximately a six week period (minimum baseline and intervention phase), this was considered an achievement. Such high completion rates are unusual in weight-related research as attrition can be problematic (Butryn, Kerrigan & Kelly, 2012); this is as the average attrition rate is 37% (Stubbs & Lavin, 2013). For disordered eating, high attrition rates are also common (Treasure et al., 1999). However, for ACT studies, the findings are mixed with self-help generally having a high compliance rate (Cavanagh et al., 2014) but attrition rates ranging from 3% (Lillis et al., 2009) to 52% (Forman et al., 2009) when ACT for weight management was delivered face-to-face. In this study, there was also a high completion rate at follow-up (five of the six participants took part) which is a further methodological strength and also indicative that most participants considered the ACT intervention feasible. It is possible that paying participants for their time may have helped retention. Alternatively, targeting emotional eating may be responsible for the high completion rates, as similar to this study, research conducted by Niemeier et al. (2012) also targeted this clinical subgroup and found a low level of treatment non-completion.

This design allowed a detailed examination of the factors under investigation, along with the interaction of external events, such as circumstantial evidence, which may have influenced outcome. This is an

advantage over previous studies which have used a cross-sectional design. Furthermore, contextual information (such as external events/factors) was recorded prospectively and routinely collected on a weekly basis during the telephone support. This means that this information may be viewed as more reliable as it was not collected post hoc and so less susceptible to recall bias (Lambert & Shimokawa, 2011). The inclusion of a change interview added strength to the findings by obtaining participants' views of the intervention which were also context-informed; this is important considering the underpinning epistemological position. Failure to capture contextual information from the monitoring calls and change interviews may have resulted in change been falsely attributed to the efficacy of the intervention. The change interviews were conducted within a one week window post-intervention, and the reason for this was to help reduce the risk of attrition and limit the likelihood of recall bias. It is possible that a longer time period would have allowed participants an opportunity for deeper reflection regarding the impact of the intervention. In addition, the weekly check-in support telephone calls were recorded allowing a treatment fidelity check as to whether the researcher adhered to the ACT model. This follows a recommendation by Öst (2008; 2014) who highlighted that a significant portion of ACT studies tend to neglect including treatment fidelity check.

This study also considered the processes involved in emotional eating, which have been neglected to date (Evers et al., 2010). Furthermore, ACT is a theoretically-informed intervention with an identified mechanism of change (psychological flexibility) and this was clearly described in this study which is a strength. This is particularly important considering that standard behavioural theory is often poorly described or not reported in interventions addressing weight loss (Booth et al., 2014; Elfhag & Rossner, 2005).

Although the findings provided evidence in support of some of the ACT variables operating as predicted in this field, further investigation of ACT processes would be helpful for tailoring interventions and ultimately informing practice. Future research would benefit from investigating this mechanism of change further so as to increase our understanding of ACT in the area of emotional eating and weight management. Research in this area would gain from measuring present moment awareness to confirm whether the findings

from this study are accurate. This is particularly important to provide clarity as very few studies measure this construct (Olson & Emery, 2015).

In line with Medical Research Council (Craig et al., 2008) guidance, whereby basic efficacy must be outlined before comparative efficacy, future research studies of this nature are necessary before ACT is compared with other models like CBT for emotional eating. It appears that self-help on its own may not adequately produce change. However, given the “guided” element, it would be useful to explore if different amounts of therapist input determined the effectiveness of the intervention. Implications have been mentioned throughout the discussion, however they are outlined in more detail in the section below.

4.6 Clinical, Theoretical and Scientific Implications

The present study has a number of clinical, theoretical and scientific implications relating to assessment, intervention, and evaluation. Evidence indicated some support for ACT processes mediating change. However, the overall picture was inconsistent. This has implications for interventions for addressing emotional eating and weight management in that interventions may either need to be refined to include a better focus on such processes, or ACT alone may be insufficient in creating a shift, and change may be dependent on the treatment modality and delivery. These points are explored in more detail below.

4.6.1 Implications for ACT regarding the processes/mechanism of change. Given that ACT research is in its infancy (Hayes et al., 2006), this study is particularly important given that some of the ACT processes appeared to serve as a mediator of change in emotional eating, and so these findings contribute to the growing evidence-base. This is particularly important considering how this study tracked change over time evidencing temporal precedence and overcoming pitfalls from earlier research which used correlational and cross-sectional designs, and neglected to measure the different ACT processes. To date, mindfulness, cognitive fusion and values are rarely explored using psychometric measures. Therefore, including measures which assess these concepts is a valuable contribution to ACT intervention research and weight loss studies more generally. This study, therefore, allows future research to draw comparisons, and answers the call for more controlled

studies to explore processes further (Gregg et al., 2015; Katterman et al., 2014).

Despite mindfulness being increasingly used in weight management (Godsey, 2013), to date, there is little evidence regarding its role and whether it actively promotes weight loss (Olson & Emery, 2015). However, the findings from the present study suggest it may play a role, along with values and fusion. The inclusion, or more emphasis, of such variables in weight management packages may enhance outcomes by helping the individual to make better decisions regarding health choices (Metcalfe & Mischel, 1999; Forman & Butryn, 2015). Nevertheless, future studies need to demonstrate replication of this effect prior to refining weight loss interventions to include a bigger focus on such variables.

4.6.2 Implications for emotional eating, weight management and ACT interventions more broadly. The findings that an ACT intervention may be helpful for some individuals who are overweight/obese and engage in emotional eating because it provides encouraging evidence that there are other means of addressing emotional eating besides from mainstream CBT approaches. This is important given that CBT is not effective for all individuals (Arch & Craske, 2008; Wisniewski, Safer & Chan, 2007).

Considering that ACT helped some participants with emotional eating, this has implications for broadly treating eating disorders. This may be considered the case given that the ACT model is viewed as transdiagnostic (Hayes, 2004). Moreover, there is also the transdiagnostic theory of disordered eating (Fairburn, 2008), whereby it is claimed that all eating disorders are maintained by similar mechanisms (e.g., distress, interpersonal difficulties, low self-esteem, over-evaluation of shape), all of which the ACT processes may address. Furthermore, given that eating disorder related thoughts are typically rigid, ACT may be particularly helpful given that it does not aim to change thoughts but aims to change the individual's relationship to their thoughts (Hayes, 2004).

The findings were mixed but indicated some promise for ACT. Therefore, weight loss interventions may not necessarily have to be overhauled. However, considering that SBT when combined with ACT produces better outcomes (Jinks et al, under review), this has clinical implications in terms of the provision of ACT as an adjunct to SBT in order to provide individuals with the

psychological skills to foster weight loss. This may be particularly important for those who are identified as “emotional eaters” who typically respond poorly to SBT alone (Forman et al., 2009; Niemeier et al., 2007; Butryn, Thomas & Lowe, 2009). ACT may also be helpful for promoting healthy behavioural changes in individuals who are highly avoidant (Lillis et al., 2011). This suggests that targeting particular client groups may be useful. However, more research is needed in order to be more confident in these conclusions.

Given that one participant no longer met the criteria as an “emotional eater” at follow-up but did not demonstrate a corresponding change in weight despite this, it is possible that factors other than emotional eating may have contributed to this participant’s weight (e.g., consuming larger portion sizes or not exercising). This highlights that it is difficult for a psychological intervention to target all factors that may contribute to an individual’s weight, and that, more broadly, it is unsurprising that for some individuals, no changes in weight will be observed as it is unlikely that any intervention will be all-encompassing. This gives more strength to the argument for combining ACT with SBT.

The findings from the present study may be useful in informing the work of clinicians in this field. This is particularly important considering how emotional eating as a concept has been considered to overlap with diagnosed eating disorders, such as anorexia and binge eating disorders, which have been considered challenging to treat (Martin-Murcia, Diaz & Gonzalez, 2011). Therefore, an intervention such as this, may be a useful resource or reference point for clinicians working with eating disorders. These findings mean that there is scope for the application of ACT to a range of health-related concerns, thus providing some added support for ACT as a transdiagnostic intervention. This has benefits in terms of simplicity, allowing more efficient training and dissemination in that ACT may be applied more broadly.

4.6.3 Implications for the mode of delivery. Clinically significant changes were observed for some participants in a brief time period, which has important implications for weight loss interventions. Due to the need to develop cost-effective and resource-efficient interventions, the modality of the intervention has implications for clinical practice (Cavanagh et al., 2014). Given the extent of the problem, this is positive as it means that following additional research, and if proven, ACT may be another intervention option which may help individuals

without the requirement of intensive support from professionals. Therefore, advantages of such self-help interventions relate to their accessibility and availability to reach those who may be inclined to decline standard treatment (Cavanagh et al., 2014). Given the prevalence of obesity, a large proportion of individuals are outside of the remit of service provision or may be reluctant in coming forward due to the stigma associated with obesity. Therefore, the provision of this intervention modality would benefit those in the early stages of this clinical problem.

However, even though the modality is more accessible and resource efficient, the treatment dose may be insufficient in improving emotional eating and aiding weight loss (Hartmann-Boyce et al., 2014). Given the mixed findings from this study, it may be better for a more intensive and expert approach for those who are struggling with emotional eating and weight management (e.g. bariatric clients) or it may be incorporated into existing interventions, whereas self-help may be used as an initial prevention or intervention strategy in a stepped care approach (Nevonen, Mark, Levin, Lindström & Paulson-Karlsson, 2006; Winzelberg et al., 2008).

Based on the feedback from participants, the intervention could be further developed by increasing the amount of therapist contact and allowing the participant to complete the intervention over a longer and flexible period. However, consideration of the level of therapist contact would also need to be considered without compromising the integrity of the guided self-help modality. Another option is that the intervention may serve as a supplement to SBT or it could be converted into a CD-ROM format and offered as a supplement to therapists who are familiar with ACT and working within the field of eating disorders and/or weight management.

The intervention was brief in comparison to some weight loss treatments which may promote engagement and be incorporated easier into real life settings for individuals with busy life schedules. Furthermore, as attrition in self-help for disordered eating is high, the lack of attrition in this study is positive. Good engagement adds support for utilising such an approach in clinical practice. Based on participant feedback, there is scope for developing this intervention through the addition of more therapist contact and increasing the time span over which the participants have to undertake the intervention. This

flexibility would enable participants to complete the intervention at their own pace, which would likely enhance engagement further and may promote change.

4.6.4 Implications for measurement. The single case design is important in tracking change and can be easily incorporated into clinical practice. Considering the drive for more focus on the mechanisms and processes of change, clinicians practicing ACT are encouraged to consider incorporating such designs into their practice. Embedding assessment into clinical practice in the format of SCED can help inform practice by monitoring progress, recognising diminishing patterns, and rectifying the course of action, if needed (Davies et al., 2007; Lambert, 2013). SCEDs facilitate rapport and also shape practice informing clinicians of whether the care provided is working and what else can be done. In turn, a SCED also forms an important part of defensible practice and is fundamental in outcome research (Bloom, Fisher & Orne, 2003; Long & Hollin, 1995). SCEDs are core to the scientist-practitioner framework enabling the clinician to provide a robust evaluation of the intervention the client has received and monitor any changes which have occurred (Davies & Sheldon, 2011).

Although the information regarding the implicit measure was variable, it provides some insight into a relatively neglected topic of emotional eating. Understanding more about implicit cognition may help poor understanding of processes relating to psychopathology (Wiers, Teachman, & De Houwer, 2007). Given that implicit measures have been shown to be able to distinguish between clinical and non-clinical populations, as well as predict behaviour and serve as an indicator of treatment progress, further research is required to shed more light on this area (Teachman & Woody, 2004). Due to the variability in responses on the implicit measure, it is difficult to firmly conclude that the measure was a reliable predictor of engagement in emotional eating or assessed treatment progress. Further research is needed before such implicit measurement may be applied reliably in clinical practice. This is worth pursuing as if implicit measurement was able to successfully predict behaviours which are not subject to self-report, there would be significant implications for practice and resources (Ellwart, Rinck, & Becker, 2006).

Patient Reported Outcome Measures (PROMs) have been considered vital in the transformation of the NHS healthcare system (Black, 2013). Therefore, asking service users about their symptoms and their health-related quality of life has been recognised (Black, 2013). In this respect, this study is important given that participants were consulted through the self-report measures used. Consideration of participants' views is important for two reasons. Firstly, as healthcare aims to reduce symptoms, asking clients is the main way of assessing change. Secondly, it avoids observer bias. Furthermore, health policy in the UK is prioritising service user empowerment and their evaluations of healthcare (McAllister, Dunn, Payne, Davies & Todd, 2012). A person-centred approach regarding the assessment of outcomes has been considered paramount (Trujols et al., 2013). This, therefore, highlights the importance of consulting recipients of care and helps shed some light on which outcome measures to focus on in future research. However, clearly due to the health consequences associated with obesity, a balance needs to be struck with consideration of the socioeconomic perspective due to the associated costs and burden on services (Cawley & Meyerhoefer, 2012; Finkelstein, Fiebelkorn & Wang, 2009; Withrow & Alter, 2011).

4.7 Conclusion

The present study employed a non-concurrent multiple baseline SCED to assess whether a brief guided self-help ACT intervention would help reduce emotional eating and subsequently aid weight management. This SCED was an ideographic approach which enabled an in-depth analysis regarding the ACT processes and mechanism of change, as well as the efficacy of this intervention modality, whilst considering context and participant feedback, in order to strengthen the conclusions drawn (Davies & Sheldon, 2011).

Despite the limitations of this study, the findings contribute to the understanding of ACT delivered in a self-help format for this clinical problem. The effects of the intervention on ACT process and outcome variables operated as predicted from an ACT perspective (Hayes, 2004). There was some evidence of mediation whereby ACT processes preceded outcome, however, the mixed picture means that non-specific factors may have played a role.

Nonetheless, these results have practical and theoretical significance as they contribute to novel ways for facilitating weight management. Employing

such an intervention modality has significant implications for service provision and service user care in terms of potential economic and health benefits. On balance, this study provides some support for and against ACT. It is hoped that this study will serve as a platform for future research to develop in this area and further increase the evidence-base of ACT as a transdiagnostic intervention.

Future research is needed to replicate the effects of the present study but also extend this research to investigate whether ACT with varying amounts of therapist input, a longer follow-up period, and if ACT as an adjunct to SBT may produce better outcomes. This information would enhance knowledge and serve to inform decision-making regarding interventions for weight management and if they need to be refined or overhauled. This would also help determine if emotional eaters may particularly benefit more from ACT interventions, allowing treatment to be tailored accordingly, and potentially alleviating some of the pressure associated with the obesity epidemic.

4.8 Critical Reflections

Context should be considered when reflecting on the process of conducting research (Murray & Kujundzic, 2005). Below I have outlined my most important reflections relating to the research process, with an emphasis on ethical, theoretical, scientific, and clinical considerations. Within this, I have explored my decision-making in terms of what worked well and what could have been improved, as well as my learning points.

4.8.1 Research topic selection. I started clinical training with a number of areas of interest and a desire to make the most out of the learning opportunity. In my previous clinical experience prior to training, I had encountered emotional eating. This was an area which intrigued me as I found it intrinsically clinically relevant. Through contact with clients in secure services, I have witnessed how obesity was becoming a growing predicament, and eating appeared to be strongly linked with distress. This was coupled with observations in my everyday life, whereby individuals would commonly engage in emotional eating as a coping strategy. Emotional eating transfers to all client groups, overlaps with other mental health difficulties and it is not constrained by diagnosis. This topic also seemed to have a growing media coverage with concerns particularly for children and how our obesogenic environment was exacerbating the problem (Forman & Butryn, 2015). The stigma and shame

associated with obesity adds to this worry with fears that this problem is getting out of control (Goss & Allan, 2009). For example, statistics predicting that over half of the population will be overweight by 2030 (Wang, McPherson, Marsh, Gortmaker & Brown, 2011). There is a clear clinical need, and due to this, I was motivated to learn if ACT would make a difference and add to evidence-based practice.

4.8.2 Reflections on the literature. My research helped increase my awareness of the wider social context of government announcements and schemes relating to obesity and emotional eating which I had not fully appreciated previously. Examples included the “Be active, be healthy” initiative which sought to increase physical activity levels and reduce obesity (Department of Health, 2004) and another government scheme “healthy lives, healthy people” (Department of Health, 2011) highlighted obesity as a health priority, whilst emphasising the need to build the evidence-base and the importance of increasing research funding in this area. Through my academic reading on emotional eating, I began to realise how obesity is pertinent to the public health agenda. Reading about how diets may help individuals who are obese but are actually a problem for those who have an eating disorder (Hill, 2007), highlighted the need for caution with such a sensitive topic, whilst also magnifying the role of psychological factors. The literature and media attention reinforced the need for a study in this area, and has built a picture consistent with my research aims. Through my reading, I was fortunate to learn more about the overlap between physical and psychological health. I learned how emotional eating may co-occur alongside other eating disorders or for individuals within the normal weight range. Indeed the latter was evident by the sheer volume of individuals within a healthy BMI range who volunteered to participate in this study; understandably this had to be carefully managed.

4.8.3 Rationale for selecting ACT self-help. There are a range of psychological models and CBT has been core to teaching on the Clinical Doctorate course. Prior to training, the majority of my clinical experience also related to CBT. Whilst there is a strength in grounding myself in an important model like CBT, I was interested to learn more about ACT and advancing my knowledge of a new approach as a personal and professional development aim. Furthermore, given that ACT seemed to divide opinions, heightened my

curiosity and desire to explore it in more depth. It would be fair to say that due to the fact that I was new to the ACT model I did not have the same enthusiasm about ACT initially as most individuals who research ACT tend to, and I think this was helpful in remaining impartial when evaluating the intervention.

Through reading, I began to learn about the overlap between ACT and CBT in that both theories were similar in ways but used different language/terms. I soon came to realise that the intervention itself may play a role in influencing change, however, as within all psychotherapeutic interventions, the role of the therapist is crucial (Norcross, 1986). With this in mind, choosing a self-help modality was a daunting task and presented with challenges considering that I was taking on an area that goes against mainstream research findings by withdrawing a critical element. It was not my intention to make the role of the psychologist redundant as I am aware how important the therapeutic alliance is and do not think that self-help can entirely replace human contact. However, I believed due to cut backs in services and the prominence of obesity, that as a trainee I was in a favourable position to evaluate an intervention modality which may have considerable clinical implications.

4.8.4 Methodological Considerations. The main reflections relevant to the method relate to the level of time, effort, duration, detail and commitment required in conducting this research study and making it viable. The impact of trying to balance a high level of demands whilst juggling course commitments was stressful at times. Although I have a range of strategies to maintain personal resilience (e.g., engaging in relaxing activities and supervision), this research required a high level of mental effort. The most challenging aspects of this study were recruitment and data analysis (discussed below).

4.8.4.1 Data collection and analysis. To address the research questions required a SCED. The preliminary state of the evidence meant that a multimodal measurement approach would be useful. However, this increased the intensity of the design, and subsequent labour. Therefore, a significant amount of time was invested in contacting individuals, responding to those who were interested, and preparing the materials for the study. It was extremely hard to recruit males in particular with only two coming forward in the whole time of data collection, one who fitted the remit of the study but did not respond when informed he was eligible, and another who volunteered after I had reached the

required sample number. Perhaps the reason why recruitment of males was poor relates to the social expectation that it is “acceptable” for females to engage in emotional eating. The fact that I was a female researcher may have increased this potential factor.

My enthusiasm for the project wavered at times in the data analysis phase, whereby I found myself surrounded by graphs, trying to figure out how to do phase lines in excel and spending hours going through data step-by-step. Understanding the data meant doing a lot of reading to familiarise myself and this was time-consuming. It was overwhelming, frustrating, and anxiety-provoking at times. However, supervision was extremely valuable in keeping me on track. Staggering the starting points for each participant also helped me to achieve a balance and manage my workload.

The data analysis process gave me insight into myself personally. I realised that I have a tendency to be meticulous but need to be careful and balance this with time management. Recognising this helped me work my strengths to my advantage by putting deadlines on the amount of time I would spend on a particular section of the project. Furthermore, as a researcher, I recognised that I was not exempt from the process or the analysis. This has been recognised by Skinner (1974) “it would be absurd for the behaviorist to contend that he is in anyway exempt from his analysis...In the very act of analysing human behavior he is behaving, as in the very act of analysis, the philosopher is thinking” (p. 258).

One unexpected risk issue cropped up during data collection when a participant disclosed a personal family issue (specifics not outlined due to confidentiality). This highlighted evidence of the development of a trusting therapeutic alliance. Considering the sensitive nature of the issue required careful management through using my clinical judgement and consulting my supervisors, and checking in with the Course Director. However, this experience highlighted the need to be risk aware at all times and the steps required to maintain the safety of the participant and myself, whilst still preserving the integrity of the study.

4.8.4.2 Motivated to maintain participant engagement and avoid attrition. Prior to clinical training, I was involved in a research project focused on enhancing engagement and readiness for treatment. My previous research

experience increased my awareness of the importance of treatment engagement as treatment non-completers often do worse than completers (McMurren et al., 2010), as well as the associated costs incurred (Sampson, James, Huband, Geelan & McMurren, 2013). Being involved in a Delphi study exploring the facilitators and barriers to treatment engagement (Tetley, Jinks, Huband, Howells & McMurren, 2012) increased my awareness of the factors I needed to consider in engaging participants in this study (e.g., location, cognitive factors, therapeutic alliance, previous negative experiences). I was also mindful of the time pressures regarding data collection and thesis write-up in line with my aim to submit to batch one given the other course deadlines in my final year.

My previous research experience highlighted how attrition is common in research and retaining participants may be a challenging task. Having an intensive research design made me worry about this more. I had a previous experience of recruiting individuals to a single case design pre-therapy intervention for alexithymia (McMurren & Jinks, 2011). However, in comparison, this study required more intensive input from participants given that they had to complete daily questionnaires over a longer period of time. Therefore, it was important to strive to reduce the challenges of participant attrition. Prioritising the completion of data collection was fuelled by anxiety that participants may drop out of the study and this may compromise my ability to meet the course standards. In line with a core belief that “I am not good enough” motivated me further as I believed that I must work extra hard to succeed for both myself but also for the welfare of the participants recruited to the study (Winnicott, 1953). I am aware of the right for participants to withdraw and followed ethical guidelines. However, to help engagement in the three month follow-up, I gave advance notice, was courteous and prompt in all email correspondence.

Confiding in my supervisors helped to manage my anxiety regarding recruitment, whilst also respecting participants' wishes. This was particularly helpful with one participant who did not start the intervention due to difficulties completing the required assessments and achieving a stable baseline. This participant was ambivalent in terms of stages of change, therefore, there was a high likelihood of non-completion in the intervention phase, particularly when commitments increased (Prochaska & DiClemente, 1992). To manage this, the

participant was given three opportunities to achieve a baseline, and consulted, before we agreed that the timing was not right for taking part. However, a copy of the self-help intervention was shared so that this participant would not miss out. I have learned ways to promote treatment engagement, albeit from a distance, as well as reduce my anxieties associated with such a design. This has been a good learning curve and will help once qualified. Despite my initial worries, fortunately data collection went relatively smoothly. On reflection, although uncertainty may be is typically intolerable (Yalom, 1980), I realise that anxiety can sometimes be a helpful motivator.

4.8.5 Learning Points.

4.8.5.1 Research preconceptions. Prior to conducting this study, I had a preconception that addressing emotional eating would aid weight management, and participants would consider symptom reduction as most helpful. However, this was not the case, as despite the lack of changes, and even weight gain for some participants, all rated the intervention highly. Reflecting back, I think these preconceptions may have been influenced by the media portrayal and public health agendas. This led me to really question what outcome is best. From an ACT perspective, these results may be considered in line with values in that “it is better to be overweight and happy, than slim and miserable”. Understandably these results are complicated by the potential of self-report bias. Nonetheless, the adverse consequences associated with obesity should not be dismissed. However, this study highlighted a potential conflict in interest between participants and the public health agenda. This has important implications for research and practice when prioritising measures and outcomes.

4.8.5.2 Design. I have increased my understanding of the practical logistics and challenges associated with this type of research design. Although intensive due to the amount of measures, it allowed consideration of context and was helpful in informing a more comprehensive picture. Triangulation (Webb et al., 1966) through the use of qualitative and quantitative measures is something I will strive to include in both research and clinical practice in the future. This has been of great value in terms of providing insight regarding the findings that may have otherwise been overlooked.

Having worked as a Research Associate for a number of years, prior to clinical training, I was mindful of the intensity of the design. There were meetings with each participant pre, mid, post, and at follow-up, which each took an hour on average and this did not include time needed for other research-related tasks, for example, organisation of the questionnaire links and telephone check-in support. However, I felt that it was important to push myself by doing a detailed and high quality research project in order for it to be considered as “value for money” particularly in the current NHS financial turn-down. However, when starting this study I did not appreciate the amount of time such a project would take, nevertheless, this was a worthwhile investment.

I was also attracted to the research design as it fitted with my epistemological position as a functional contextualist, whereby the aim is to predict with “precision, scope and depth”, in line with this framework (Hayes, 2004). Another reason why I chose to undertake a SCED was as it is a useful research design which can be easily incorporated into clinical practice. Given that there is a reduction in the amount of research conducted by clinical psychologists in the UK (Eke, Holttum & Hayward, 2012; Thomas, Turpin & Meyer, 2002; Davey, 2002), it is critical that accessible research designs are promoted. This is important from a scientist practitioner perspective as research is what makes our profession distinct and justifies our banding according to the agenda for change.

If I were to re-start this project, I would deliver a different type of intervention modality, for example, a combination of face-to-face individual sessions with a self-help format to explore whether increased therapist input may result in better outcomes. I would also conduct a functional analysis in relation to each individual’s eating behaviour in order to clarify whether the intervention helped or resulted in iatrogenic effects. Due to the problems with self-report and the importance on having tangible outcomes, the inclusion of a Fitbit activity monitor would be useful in informing the results (Yuen, Park & Friedman, 2012).

4.8.5.3 Peer support. Data collection and analysis helped my development as a researcher. Previously, I was used to doing research in teams and moving to largely conduct it on my own increased my sense of autonomy. Having a similar research design to a couple of other trainees in my

cohort created an opportunity to collaborate on issues which arose, whilst offering a sense of support. Reflecting on the process together and sharing the pressure was in itself cathartic, allowing us to maintain the momentum of our studies, and ultimately enabling the research process to run more smoothly. However, the process of doing so made me mindful of the importance of acknowledging each individual's contribution which is particularly pertinent in order to make each project distinct. Having approached my thesis with a team mind set I fell into a team role in terms of inadvertently sharing aspects of the project and had to make sure I did not compromise the integrity of my own project. To rectify this, I had to assert myself as an autonomous researcher by using my communication skills to maintain the integrity of my research design whilst balancing this with my relationships with other researchers. This was something I did not anticipate in starting this research. However, this experience has been a good learning curve as it has made me aware of the ethical challenges for researchers (BPS, 2006a,b).

4.8.5.4 Clinical and transferable skills. My learning from this project has increased my research capacity and informed my practice. As the study progressed, I became better at time management and prioritising according to key aims, whilst juggling other commitments; these are skills which may be transferred to clinical practice. When working with individuals in a research capacity and not as a clinician, I had to be mindful of adhering to ACT during the weekly check-in support calls and not fall into the “CBT trap” of challenging thoughts. Having the weekly telephone calls recorded and being mindful of an eventual treatment fidelity check helped keep me on board and added rigour to the study.

The provision of support for the intervention was a valuable learning experience. Having a good knowledge of the self-help intervention and doing the comparative analysis meant that I felt more confident in providing the telephone check-in support. When on the telephone, I drew on different skills in comparison to face-to-face clinical encounters as non-verbal communication was restricted. I was always mindful of the language used (given that ACT can be jargonistic) by ensuring I communicated psychological information sensitively and at an appropriate pace. I was flexible and responsive to each participant, for example, by patiently waiting for each participant to answer the telephone or

responding well when encountered difficulties with signal and recording equipment. I scheduled calls with each participant in advance, which were mostly adhered to. However, there were occasions when participants forgot or had a personal life issue which interfered with the process. When the latter occurred, I made sure to enquire which allowed me to prospectively collect relevant contextual information to inform the results of the study, whilst preserving rapport.

My skills as a clinician were valuable in establishing and maintaining rapport with participants. My previous research experience made me aware of the importance of developing good relationships with participants and considering potential barriers to recruitment, and problem-solving these in advance. For example, in relation to data collection, I planned an early start in order to navigate the summer holidays when students may not be available. In doing so, I chose to begin recruitment for two participants over the Christmas time period, this decision was intentional as I believed that this would be a “real test” of the efficacy of this ACT intervention given how Christmas is a social time for eating.

4.8.5.5 Supervision. My research project benefited from supervision of three Clinical Psychologists, each of whom had their own unique skill set and helped me to consider the project from a range of angles. This was helpful in developing my thinking but also enhancing the comprehensiveness of the project, and ensuring it remained relevant to clinical practice without compromising scientific rigour. Through the use of supervision, I believe that I have developed both clinically and academically by understanding more about the intricacies of this research design and its application to practice. My supervisors were patient in answering my endless list of questions and providing clarity regarding the links between theory and practice. I appreciate the importance of good supervision and I will strive to re-create a similar positive experience should I be fortunate to be in a position to supervise a doctorate project in the future.

4.8.6 Summary.

My research journey has equipped me with a better understanding of disordered eating and obesity, as well as ACT. My clinical training and experiences on placement have helped me consider and appreciate the value

of the implications of this research project. Clinical training has increased my confidence as a researcher and as a clinician, highlighting my strengths and helping me to notice and manage my learning needs through supervision. Such transferable skills will be instrumental in helping me once qualified (Walker, Read & Priest, 2013).

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Appendices

6.1 Appendix A: Demographics - Data Collection Form

ID _____

Age _____

Year of Birth _____

Gender (1) Male (2) Female

Employment status: (0) full-time (1) part-time
(2) disability (3) no income

Student status (if applicable): (0) full-time (1) part-time

Ethnicity _____

Anthropometric Measurements _____ Height (cm) _____ Weight (kg)

6.2 Appendix B: Daily ACT Measure of Psychological Flexibility

Thinking back over your experiences TODAY, please rate your agreement with the following statements:

0 – strongly agree; 1 – agree; 2 – neutral; 3 – disagree; 4 - strongly disagree

Acceptance

Philadelphia Mindfulness scale (items 2, 6, and 12)

- I tried to distract myself when I felt unpleasant emotions.
- I tried to stay busy to keep thoughts or feelings from coming to mind.
- There were things I tried not to think about.

Defusion

Cognitive fusion questionnaire (items 1, 10, 16)

- My thoughts caused me distress or emotional pain.
- I got very entangled in my thoughts.
- I got so caught up in my thoughts that I was unable to do the things that I most wanted to do.

Mindfulness (i.e., present moment awareness and self-as-context)

Mindful Attention Awareness Scale (MAAS) (items 3, 7, 14)

- I found it difficult to stay focused on what was happening in the present.
- It seemed I was “running on automatic” without much awareness of what I was doing.
- I found myself doing things without paying attention.

Valued living (i.e., values and committed action)

Valued Living Questionnaire (items 5, 8, 9)

- I made choices based on my own values even if it was stressful.
- My values were really reflected in my behaviour.
- How I behaved fits in with my personal wants and desires.

6.3 Appendix C: Change Interview Summary of Responses

| Question | Summary of responses |
|-----------------------------|--|
| Opinion on the intervention | <ul style="list-style-type: none"> N = 6 reported that they liked the intervention and found it helpful. n = 1 reported that she would have liked more time to read the book (P1). |
| Did the book make sense | <ul style="list-style-type: none"> N = 6 agreed that the book was clear, easy to read, and was well written. They reported that they found the content engaging and they could relate to it. n = 2 noted that the researcher was available to provide clarification if needed (P2 and P6). n = 2 reported that they found the book a little patronising at times due to some of the analogies that were used (P2 and P5). n = 1 reported that she did not engage in some of the exercises (P5). n = 1 found the book slightly repetitive in parts (P5). |
| Recommend the book | <ul style="list-style-type: none"> N = 6 reported that they would recommend the book. n = 5 reported that they had already recommended the book to others (e.g., to a friend, their sister or their mother) (P1, P3, P4, P5, and P6). |
| Most helpful aspects | <ul style="list-style-type: none"> n = 4 considered values as most helpful (P1, P2, P3, and P5) n = 1 reported self-monitoring and the process of taking part in the study (P5). n = 2 considered mindfulness as helpful (P4 and P6). n = 2 considered acceptance as helpful (P4 and P6). n = 1 considered the chapter on 'weight loss know how' helpful (P6). n = 3 reported that they liked how the past was linked with the present (P1, P2, and P5) n = 3 reported finding the whole book helpful (P1, P3 and P5). n = 1 reported that the timing of participating in the study was appropriate for her (P4). n = 1 reported finding the visualising exercises useful (P6). |

Question

Least helpful aspects

Changes experienced

Changes classed as positive or negative

How surprised by the changes from 1 (not surprised) to 5 (surprised)?

How likely the changes were a result of the intervention from 1 (not likely) to 5 (likely)?

The importance of the changes from 1 (not important) to 5 (important)?

Summary of responses

- n = 4 made no explicit comment about what they did not like or found least helpful.
- n = 1 reported that she did not like how the book contradicted itself by suggesting that one should not follow rules/diets but then included a weight loss summary (P1).
- n = 1 reported that she didn't like the epitaph (P2).
- n = 5 reported a change in outlook and a clarification of values (P1, P2, P3, P4, and P6).
- n = 3 reported an increase in self-awareness and food intake (P1, P2, and P5).
- n = 2 reported an increase in acceptance (P1 and P6).
- n = 2 reported a reduction in emotional eating (P1 and P4).
- n = 1 reported not feeling guilty after eating (P1).
- n = 1 reported not punishing herself (P1).
- n = 1 reported a reduction in her level of avoidance (P1).
- n = 1 reported that she found she was less self-critical about her clothes size (P6).
- n = 1 reported feeling good about herself (P6).
- N = 6 classed the changes as positive.
- n = 5 provided a rating of 4 (P2, P3, P4, P5, and P6).
- n = 1 gave a rating of 5 (P1).
- n = 2 gave a rating of 5 (P2, P4).
- n = 4 gave a rating of 4 (P1, P3, P5, and P6).
- n = 4 gave a rating of 5 (P1, P2, P3, and P4).
- n = 1 gave a rating of 4 (P5).
- n = 1 gave a rating of 3 (P6).

Question




External events during the study period

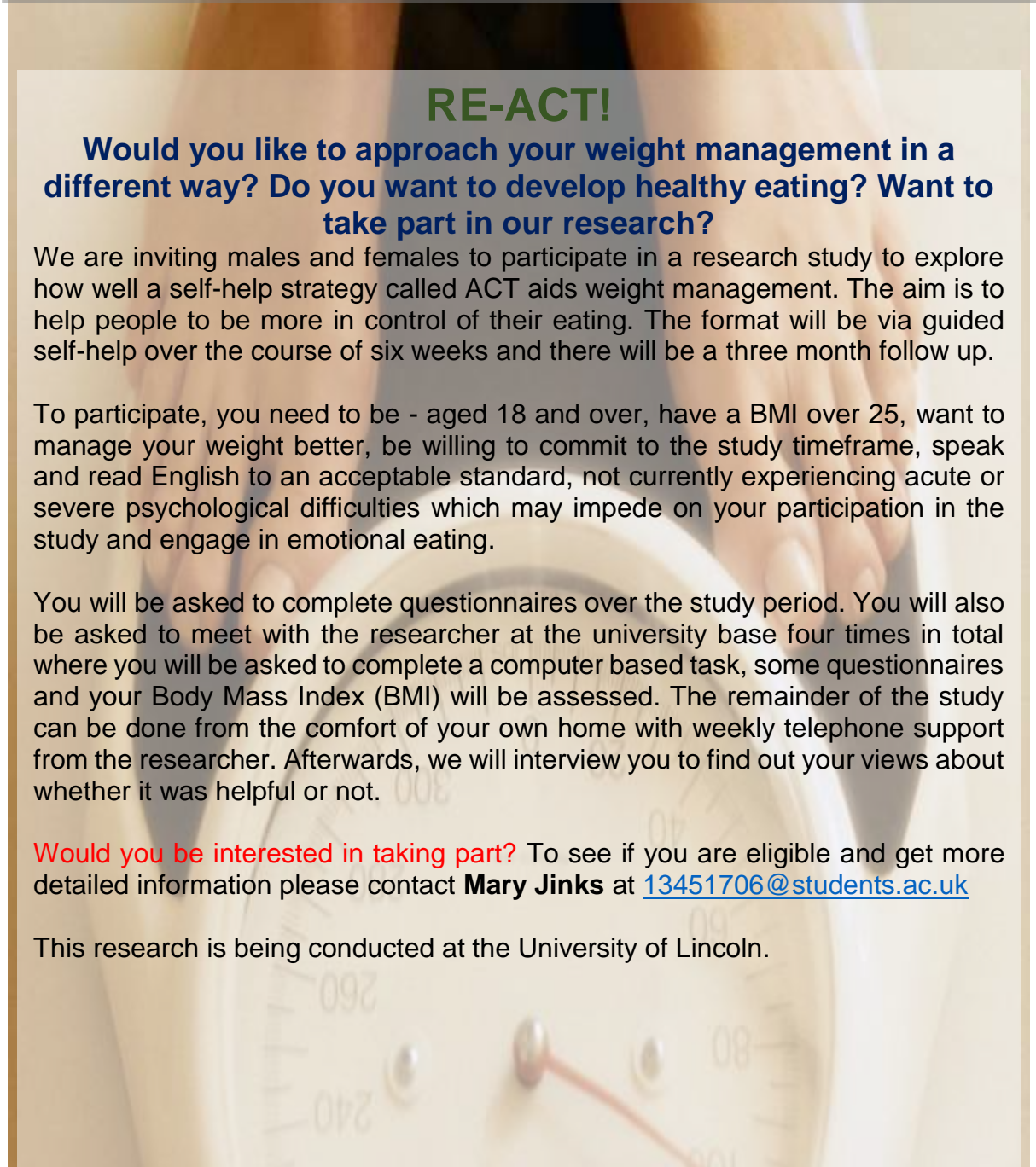
Summary of responses

- Preparation for Christmas (reported finding it stressful) (P1)
- Christmas time (P2)
- Transition to parenthood, and then returning to work from maternity leave (consequently driving more and less active) (P5)
- Went on holiday (disrupted routine) (P6)
- University assignments and exams (P2 and P6)
- Physically unwell (P3 and P5)
- Demands in life e.g., work and family (P2 and P5)
- Family problems (P1 and P6)
- Pressure of family events (P6)
- Relationship breakup (P1)
- Car broke down (P1)
- N = 6 gave a positive review of the researcher, commenting that they found her supportive, caring, encouraging, fun, organised, efficient (prompt responding to emails, sending reminders about questionnaires), passionate about the study but still participant focused.

How they found the researcher

6.4 Appendix D: Recruitment Advertisement





RE-ACT!

Would you like to approach your weight management in a different way? Do you want to develop healthy eating? Want to take part in our research?

We are inviting males and females to participate in a research study to explore how well a self-help strategy called ACT aids weight management. The aim is to help people to be more in control of their eating. The format will be via guided self-help over the course of six weeks and there will be a three month follow up.

To participate, you need to be - aged 18 and over, have a BMI over 25, want to manage your weight better, be willing to commit to the study timeframe, speak and read English to an acceptable standard, not currently experiencing acute or severe psychological difficulties which may impede on your participation in the study and engage in emotional eating.

You will be asked to complete questionnaires over the study period. You will also be asked to meet with the researcher at the university base four times in total where you will be asked to complete a computer based task, some questionnaires and your Body Mass Index (BMI) will be assessed. The remainder of the study can be done from the comfort of your own home with weekly telephone support from the researcher. Afterwards, we will interview you to find out your views about whether it was helpful or not.

Would you be interested in taking part? To see if you are eligible and get more detailed information please contact **Mary Jinks** at 13451706@students.ac.uk

This research is being conducted at the University of Lincoln.

6.5 Appendix E: Email from Professor Steve Hayes

On Thu, Jan 16, 2014 at 12:58 PM:

Steven Hayes, Mary Jinks <https://contextualscience.org/user/X>) has sent you a message via your contact form (<https://contextualscience.org/civcrm/profile/view>) at Association for Contextual Behavioral Science.

Message:

Dear Professor Hayes,

Hope this email finds you well. I have read some of your work on ACT and find it really inspiring and clinically relevant.

I am a first year trainee on the Trent Clinical Psychology Doctorate in the UK and I am hoping to potentially undertake my thesis on an ACT-informed single case for eating behaviour. I am very much in the planning stage and am currently considering the format of the intervention (am currently considering a self-help format with telephone support). I think your book 'Get Out of Your Mind and Into Your Life: The New Acceptance and Commitment Therapy' is an extremely useful resource. Therefore, I was wondering if it may be possible to use or adapt the book please for the purposes of my proposed study? Could I have your permission for this?

Can I also ask you-given your expertise in this area if you may have any recommendations which you think I should keep in mind? Thank you in anticipation.

Kind wishes

Mary

Steven Hayes stevenchayes@gmail.com

Jan 16

Sure ... that could work. There are also several new texts out in the area that might be better though;

The Weight Escape (Harris, Ciarrochi, and others)

The Diet Trap (Lillis, Dahl, and Weineland)

Your Body and other things you hate (Sandoz)

- S

Steven C. Hayes

Foundation Professor and Director of Clinical Training

Department of Psychology /298

University of Nevada

Reno, NV 89557-0062

"Love isn't everything, it's the only thing"

hayes@unr.edu or stevenchayes@gmail.com

Fax: [\(775\) 784-1126](tel:(775)784-1126)

Psych Department: [\(775\) 784-6828](tel:(775)784-6828)

Home (use sparingly): [\(775\) 746-3121](tel:(775)746-3121)

Cell (even more so): [\(775\) 848-0689](tel:(775)848-0689)

Reply

Jan 16

Hi Professor Hayes,

Many thanks for getting back to me- it is much appreciated. I have also been in touch with Jason Lillis regarding the 'Diet trap' and he has also given me permission to adapt this for the purposes of this study. I will also look into the other texts you have recommended- thanks for this suggestion, that's great.

Best wishes,

Mary

6.6 Appendix F: Comparative Analysis

| “The Weight Escape” (Ciarrochi et al., 2014) | VS | “The Diet Trap” (Lillis et al., 2014) |
|---|----|---|
| Total: 233 pages (including 35 pages containing nutrition information as well as recommended exercises to be covered over 7 weeks). | | Total no. of pages = 185 (brief exercises included within each chapter). |
| No. of chapters: 12 | | No. of chapters: 7 |
| Starts with goals and values | | Ends with goals and values |
| Longer read, smaller text in comparison to the other option. Whilst it may turn participants off, it could also be considered more comprehensive. | | Bigger font size used and briefer than other option. The briefer book may engage participants, however, it may not be comprehensive. |
| Author keen for book to be used, may respond quickly. | | Authors gave their permission to use the text, however they took longer to respond. |
| Includes diet advice and nutrition information. | | Contains only a small bit of nutrition information at the end. Assumes dieting knowledge and asks the reader to keep a brief journal to make notes. |
| There does not seem to be a focus on Committed Action. | | Only a brief focus on Committed Action |
| The ACT processes seem to be overlap a lot within each chapter. | | ACT processes overlap a lot within each chapter. |
| Includes stories which are engaging to start with but then sometimes a little off topic and wordy. | | More engaging read in my opinion. |
| For some chapters, it is unclear which ACT process is being targeted. | | ACT processes seem to be more clearly presented here |

6.7 Appendix G: Permission to Use/Adapt Materials for ACT Intervention

On Thu, Jan 16, 2014 at 3:21 PM, <maryjinx@gmail.com> wrote:

Jason Lillis,

MaryJ (<https://contextualscience.org/user/maryj>) has sent you a message via your contact form (<https://contextualscience.org/civicrm/profile/view>) at Association for Contextual Behavioral Science.

Message:

Hi Dr Lillis,

Hope this email finds you well. I am a first year trainee on the Trent Clinical Psychology Doctorate in the UK and I am hoping to potentially undertake my thesis on an ACT-informed single case for eating behaviour. I am very much in the planning stage and am currently considering the format of the intervention (am currently considering a self-help format with telephone support). Whilst doing my background reading, I have come across a treatment manual 'Obesity Stigma and Weight Management Acceptance and Commitment Therapy Treatment Manual' you devised, which I think is excellent! I was wondering if I could perhaps seek your permission to adapt this manual for use in my proposed study please? This would be much appreciated.

I also understand that you have co-authored a book with Sandra Weineland and JoAnne Dahl entitled the 'Diet trap'-can I ask you if it would be ok to potentially adapt some of the content for my proposed study please? Can I also please check with you if this book is based on the six week internet based programme mentioned in Sandra's 2012 paper in combination with the intervention you devised? I have recently just placed an order with amazon for a copy of the book! I am looking forward to reading it.

Thank you in anticipation.

Kind wishes

Mary

----- Forwarded message -----

From: **Jason Lillis** <jasonlillis22@gmail.com>

Date: Thu, Jan 16, 2014 at 8:24 PM

Subject: Re: [Association for Contextual Behavioral Science] Query please-
ACT for weight loss

To: maryjinx@gmail.com

Hi Mary,

Yes, you have my permission to use my protocol and the book whatever way you see fit. Sounds like an interesting project and I wish you the best with it. The book (The Diet Trap) is not based on Sandra's 2012 paper directly, although all of the methods from all of our studies informed how we wrote the book of course.

Thank you for your interest and good luck with your research, let us know how it goes.

Sincerely

Jason

Jason Lillis, Ph.D.

Associate Editor, Journal of Contextual Behavioral Science

Assistant Professor (Research)

Brown Alpert Medical School/ The Miriam Hospital

Weight Control and Diabetes Research Center

196 Richmond Street

Providence, RI 02903

Phone: (401) 793-8375

Fax: (401) 793-8944

Jason_Lillis@brown.edu

6.8 Appendix H: Ethical Approval

From: SOPREC

Sent: 28 July 2014 14:00

To: Mary Jinks (13451706)

Cc: Judith Tompkins

Subject: Ethical application PSY131428

Hi Mary.

This is to confirm that your recent ethics application has been approved, subject to the Chair of SOPREC (Dr Patrick Bourke pbourke@lincoln.ac.uk) being added to the consent form/questionnaire.

Thanks

Zoë

School of Psychology Research Ethics Committee |
SOPREC
College of Social Science
University of Lincoln. Brayford Pool, Lincoln, Lincolnshire.
LN6 7TS
Email – soprec@lincoln.ac.uk

From: Mary Jinks (13451706)

Sent: 29 January 2015 16:07

To: Zoe Mead; SOPREC

Subject: Minor amendment request regarding ethical application PSY131428

Hi Zoë,

Hope this email finds you well. My research project 'Regulating eating through ACT' received ethical approval by SOPREC in July (confirmation email below) and I have started recruitment. The reason why I am getting in touch is because in my research proposal I mentioned that I will see participants on campus

(which I have been doing), however one participant has requested if I could meet her elsewhere (- an appropriate venue would be identified for this to take place, e.g., booking a room in a library or somewhere that has meeting facilities so as to maintain confidentiality) so I would like to submit a minor amendment to SOPREC please. I have attached a copy of my research proposal with this proposed change highlighted in yellow (pages of reference are 6, 7, 9, 25, 30 and 44). I have already noted in my research proposal that I will adhere to appropriate university policies, for example, Lone Working. Can you please confirm if this is okay? Thank you in anticipation.

Kindest regards,

Mary

From: SOPREC

Sent: 04 February 2015 13:53

To: Mary Jinks (13451706)

Subject: FW: Minor amendment request regarding ethical application
PSY131428

Dear Mary

This is to confirm that your changes have been approved by the committee

Regards

SOPREC

From: Mary Jinks (13451706)

Sent: 04 February 2015 13:57

To: Soprec

Subject: RE: Minor amendment request regarding ethical application
PSY131428

Hello,

This is great news- thanks very much for this.

Kind wishes

Mary

6.9 Appendix I: Information Sheet



(Final version 1.0: 24/01/14)

Title of Study: RE-ACT (Regulating Eating through ACT).

Name of Researchers: Mary Jinks, Nima Moghaddam, Dave Dawson, and Mike Rennoldson.

You are invited to take part in our research study, however before you decide, we would like you to understand why the research is being done and what taking part would involve for you. One of our researcher's will go through the information sheet with you and answer any questions you have. Feel free to talk to others about the study too if you want or ask us if you would like further information.

What is the purpose of the study?

The aim of the study is to explore the effectiveness of a brief self-help ACT strategy for aiding weight loss and helping with emotional over-eating (e.g., due to stress, anxiety). For this we are asking you to complete a self-help intervention and a series of measures (all of which will be explained to you in detail). The study will be conducted by a Trainee Clinical Psychologist who will include the write-up as part of her Clinical Psychology Doctorate thesis which will be submitted to the University of Lincoln.

Why have I been invited?

You are being invited to take part because you have expressed an interest and also because you meet our shortlisting criteria. We are inviting five participants like you to take part.

Do I have to take part?

Taking part is entirely your decision. If you do wish to take part, you will be given this information sheet to keep and you will be asked to sign a consent form. Also if you do decide to participate you may still withdraw at any time and do not have to give a reason.

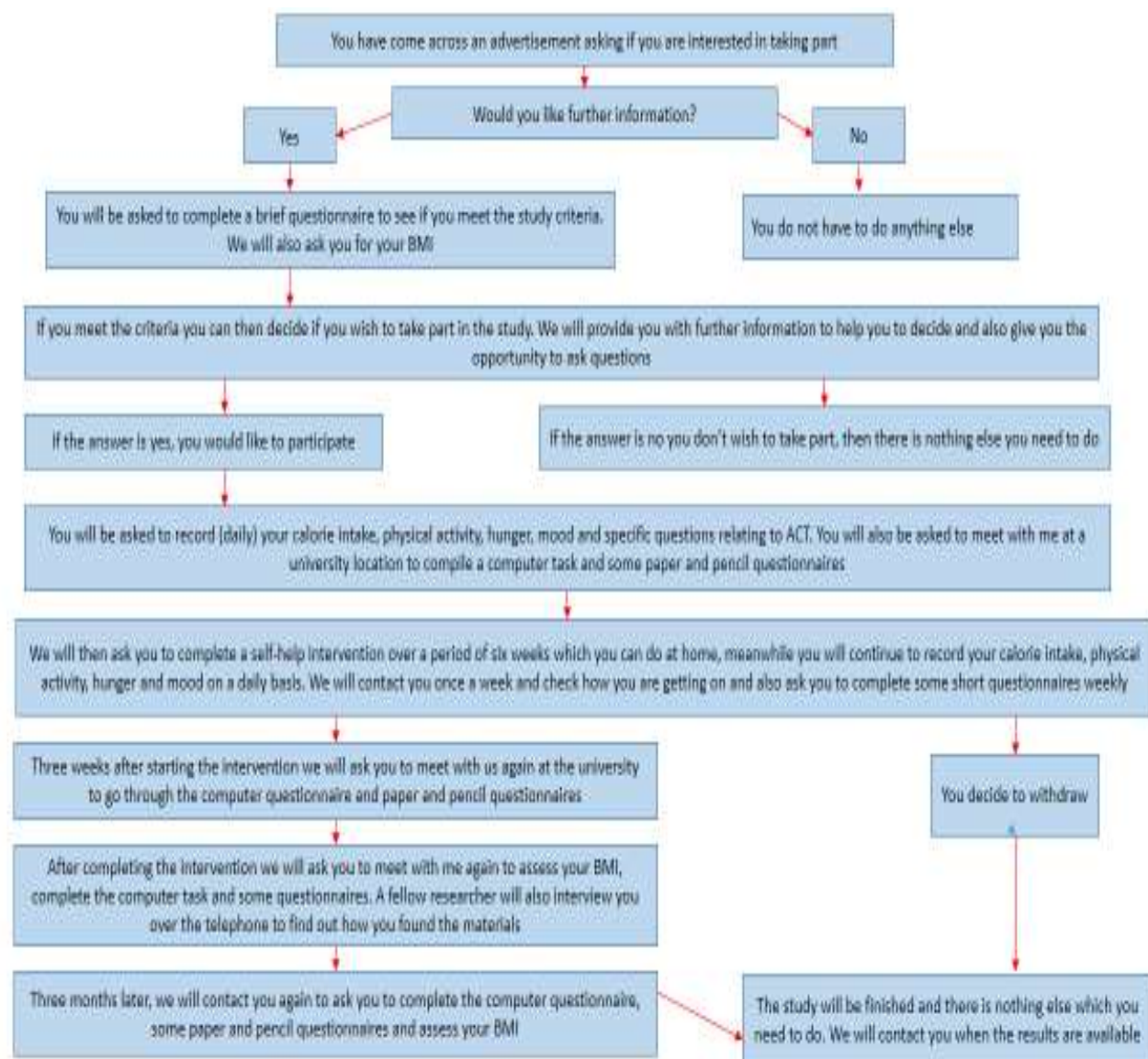
What will happen if I take part?

A time which is convenient for you to come to the university will be arranged. At the first meeting, time will be spent going over the details of the study and what will be involved. Your weight and height (Body Mass Index - BMI) will be assessed and you will be asked to complete some questionnaires. The first session will take approximately 45 minutes.

The study will involve completing daily measures whereby you will be asked to record your calorie intake, physical activity, mood and be asked questions specifically related to the intervention. These can be completed online. We will also ask to meet with you at the university four times in total, once prior to starting the intervention (as mentioned above), once during the intervention (approximately three weeks in), after completing the intervention (six weeks after starting) and again in three months' time. Each time I meet with you, you will be asked to complete a brief questionnaire on a computer (which will take approximately five minutes) and some paper and pencil questionnaires (approximately ten minutes), and your BMI will be reassessed.

We will also ask you to complete a brief supportive self-help from home which will be over a period of six weeks. This will be in the format of a book called 'The weight escape' which will consist of a number of chapters and you will be guided through what to read each week. There will also be some questionnaires to complete weekly and I will check in with you weekly over the telephone to see how you are getting on with the intervention and the study generally. The flow chart represents each stage of the study and what will happen if you agree to take part.

Study procedure flowchart



Expenses and payments

If you agree to take part you will be paid an inconvenience allowance to participate in the study (£50 cash) plus £10 if you agree to take part in the follow-up assessment in three months' time. If you decide to withdraw from the study, you will not receive payment for your time. Travel expenses will not be offered for participation.

What are the possible disadvantages or risks of taking part?

By agreeing to take part in the research you will be giving up some of your time to answer questionnaires and undertake the self-help. You may feel

uncomfortable being weighed or being asked questions about your eating habits and mood; however all information will remain confidential. Participating in this study may also influence your eating habits or also mean that you become aware of your mood more which might make you feel self-conscious, so it is recommended that you consider this before agreeing to take part. Also, the self-help intervention may not work. However, being more aware of your mood and eating habits might have benefits in terms of weight loss and increased self-awareness. If you become upset or find that you need extra support we have provided contacts for help you can seek on this information sheet.

What are the possible benefits of taking part?

You will be contributing to the scientific evidence on weight loss. You may also find the intervention helpful in terms of your own weight loss or find it increases your understanding and self-acceptance. We cannot guarantee the study will benefit you however the information we get from this study may help further our understanding of this area for others.

What happens when the research study stops?

The research will be written up as part of a clinical psychology doctorate at the University of Lincoln. It will also be submitted for publication. You will remain anonymous in any publications or presentations.

What if there is a problem?

Taking part in this study is unlikely to cause you harm, however if you have a concern about any aspect of this study, you should ask to speak to the team who will do their best to answer your questions. The team's contact details are given at the end of this information sheet. If the chief researcher cannot help with your concerns and you wish to complain formally, you can do this by contacting the research supervisors (contact details provided below). Also the contact numbers for support help lines are also included below in case needed.

Will my taking part in the study be kept confidential?

Yes. In accordance with ethical and legal practice all information collected during the study will be kept strictly confidential. Any identifying characteristics, for

example, your name will not be included in any published papers. In fact the information you provide will be coded, anonymised and stored securely in locked cabinet files or on password protected computers as soon as is reasonably possible. The only people who will have access to this data will be the researcher, research supervisors, administration staff and authorised persons from the University of Lincoln. All staff will adhere to confidentiality.

If, however, during the course of the study you disclose something which would raise our concerns for your safety or of someone else, this information would be passed onto the relevant authorities. Your data will only be used in this study unless you give your consent for it to be used in another study in terms of secondary analysis. Following your completion of the study, your data will be stored for approximately seven years in line with the university requirements. After this time your data will be disposed of securely.

What will happen if I don't want to carry on with the study?

You are free to withdraw at any time, without giving a reason as your participation is voluntary. If you withdraw and wish to remove your data from the study, then you must inform the researchers within two weeks of taking part or withdrawing participation – after two weeks, your information cannot be removed and may still be used in the project analysis.

What will happen to the results of the research study?

The results of the study will be presented to the department of psychology at the University of Lincoln and may be included on the B-EAT website. The research will also be written up for publication and presented at conferences should opportunities arise, you will remain anonymous in any presentation of the data, a copy of the findings of the study may be provided on request by contacting Mary Jinks at 13451706@students.lincoln.ac.uk

Who is organising and funding the research?

The University of Lincoln is organising and funding this research study.

Who has reviewed the study?

A Research Ethics Committee, which is an independent group of people who have your best interests in mind, look at all research. This research project has been reviewed and given favourable opinion by the University of Lincoln Research Ethics Committee.

Further information and contact details

Mary Jinks, Trainee Clinical Psychologist (13451706@students.lincoln.ac.uk)

Address: Trent Doctorate in Clinical Psychology, College of Social Science, University of Lincoln, 1st Floor, Bridge House, Brayford Pool, Lincoln, LN6 7TS.

Under the supervision of Dr Nima Moghaddam (nmoghaddam@lincoln.ac.uk),
Dr Dave Dawson (ddawson@lincoln.ac.uk) and Dr Mike Rennoldson
(Michael.Rennoldson@nottingham.ac.uk).

Helplines

BEAT (eating disorder service) helpline 08456341414, email: help@b-eat.co.uk

Samaritans (24 hours a day) 08457909090, website: www.samaritans.org

Lincoln counselling service 01522886181, email: counsellors@lincoln.ac.uk

Alternatively you may wish to speak to your GP⁷⁸.

⁷⁸ RE-ACT (Regulating eating through ACT) Participant Information Sheet Final Version 1.0
24/01/14

6.10 Appendix J: Consent Form



(Final version 1.0: 24/01/14)



Title of Study: RE-ACT (Regulating Eating through ACT).

Name of Researcher: Mary Jinks

Please initial box

Name of Participant: _____

1. I confirm that I have read the information sheet version number one dated 24/01/14 and have had the opportunity to ask questions. ☐
2. I understand that I am free to withdraw at any time, without giving any reason, as my participation is voluntary. Furthermore, I understand if I want to remove my data from the study I must do this within two weeks of withdrawing (see information sheet). ☐
3. I understand that some of my data collected in the study may be looked at by the following; authorised individuals from the University of Lincoln, the research group and regulatory authorities where it is relevant to my participation. I give permission for these individuals to have access to these records and to collect, store, analyse and publish information obtained from my taking part in this study. I confirm that I am aware that my personal details will be kept confidential. ☐
4. I give permission to be contacted in order to complete the required assessments associated with this study, questionnaires, the self-help book and weekly telephone support (- this will be recorded). ☐
5. I give permission to be contacted again to complete a follow-up interview, which will be recorded. I understand that direct quotes (anonymous) from the interview may be used in the study reports. ☐
6. I give my permission for my data to be used in other studies (secondary analysis) ☐
7. I agree to take part in the above study. ☐

Name of Participant

Date

Signature

Name of Person taking consent Date

(If different from Principal Investigator)

Signature

6.11 Appendix K: Prompt for Weekly check-in telephone support

Prompts

- Hello, how are you? Is this an okay time to talk?
- Can I check if you read the assigned chapter(s) this week?
- If not, why not?
- If so, how did you find them?
- Did you complete the associated exercises?
- Is there anything you would like to talk about?
- Were there any parts you didn't understand, or you would like me to clarify?
- Have you noticed any changes this week in terms of your thoughts, feelings or behaviour?
- Have you any questions regarding the study procedure?
- What was your main take home message?
- Any questions?
- What day and time next week suits you best for the call?

6.12 Appendix L: Table L26 Presenting Raw Data Relating to RCI and CSC

Table 26.

Raw data relating to RCI and CSC

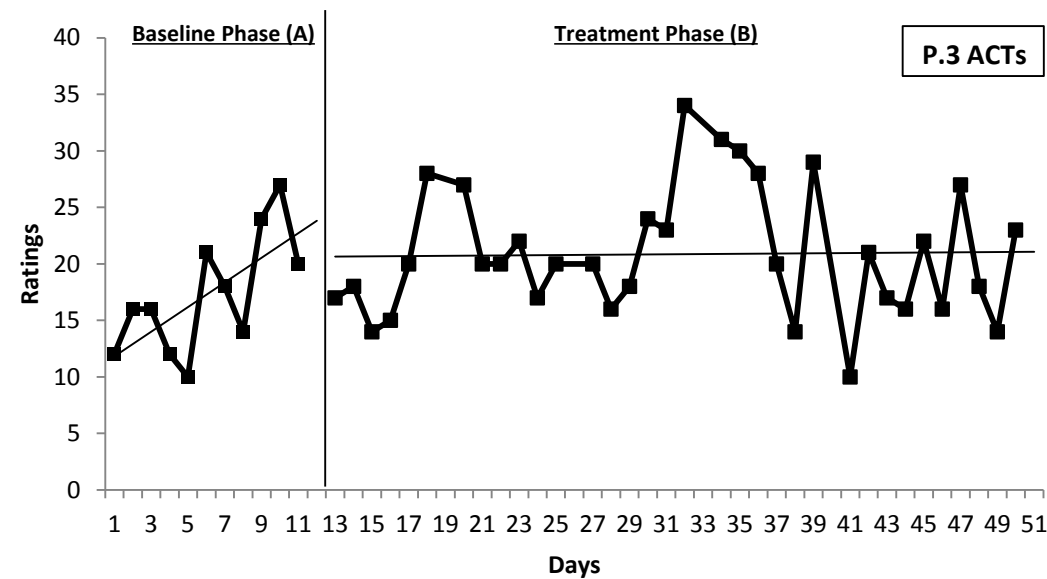
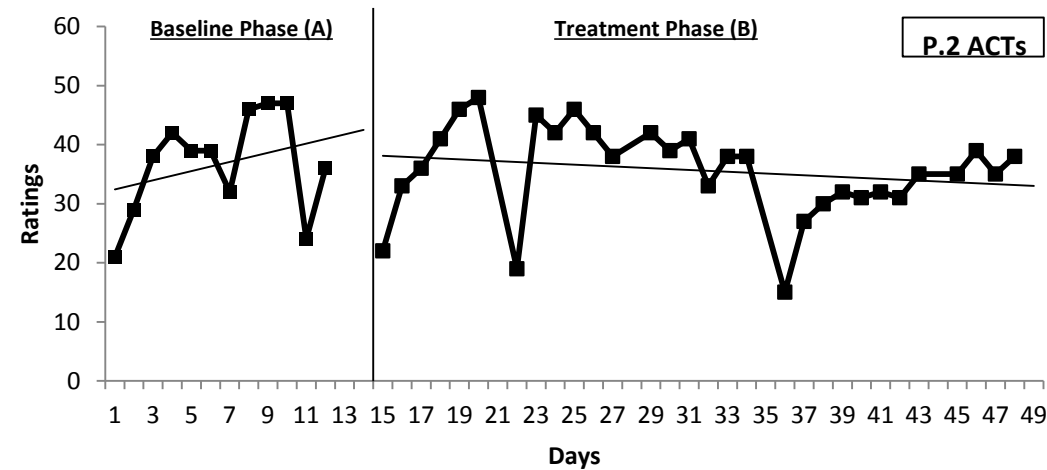
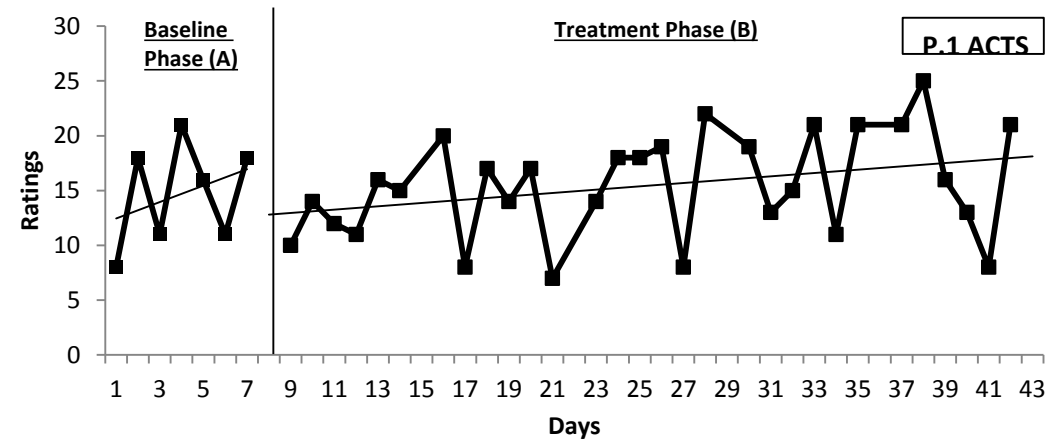
| Measure | P. | Pre | Mid | Post | FU | RCI (Pre- mid) | RCI (Pre- mid) | CSC (Pre- mid) | CSC (Pre - mid) | RCI (Pre- post) | RCI (Pre- post) | CSC (Pre- post) | CSC (Pre- post) | RCI (Pre- FU) | RCI (Pre- FU) | CSC (Pre- FU) | CSC (Pre- FU) |
|---------|----|-----|-----|------|-----|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|
| CFQ | | | | | | | | | | | | | | | | | |
| | 1 | 45 | 45 | 49 | NA | 0 | No | 28.38 | No | -1.01 | No | 28.38 | No | NA | NA | NA | NA |
| | 2 | 34 | 36 | 31 | 22 | -0.51 | No | 28.38 | No | 0.76 | No | 28.38 | No | 3.04 | Yes | 28.38 | Yes |
| | 3 | 39 | 33 | 45 | 20 | 1.52 | No | 28.38 | No | -1.52 | No | 28.38 | No | 4.81 | Yes | 28.38 | Yes |
| | 4 | 28 | 21 | 21 | 18 | 1.77 | No | 28.38 | No | 1.77 | No | 28.38 | No | 2.53 | Yes | 28.38 | Yes |
| | 5 | 19 | 24 | 26 | 16 | -1.27 | No | 28.38 | No | -1.77 | No | 28.38 | No | 0.76 | No | 28.38 | No |
| | 6 | 41 | 21 | 25 | 24 | 5.07 | Yes | 28.38 | Yes | 4.05 | Yes | 28.38 | Yes | 4.31 | Yes | 28.38 | Yes |
| PHLMS | | | | | | | | | | | | | | | | | |
| Accept | | | | | | | | | | | | | | | | | |
| | 1 | 16 | 16 | 17 | NA | 0 | No | 27.06 | No | 0.26 | No | 27.06 | No | NA | NA | NA | NA |
| | 2 | 33 | 23 | 26 | 28 | -2.61 | Yes | 27.06 | No | -1.83 | No | 27.06 | No | -1.3 | No | 27.06 | No |
| | 3 | 29 | 25 | 29 | 30 | -1.04 | No | 27.06 | No | 0 | No | 27.06 | No | 0.26 | No | 27.06 | No |
| | 4 | 20 | 24 | 28 | 33 | 1.04 | No | 27.06 | No | 2.09 | Yes | 27.06 | No | 3.39 | Yes | 27.06 | Yes |
| | 5 | 37 | 32 | 31 | 37 | -1.3 | No | 27.06 | No | -1.57 | No | 27.06 | No | 0 | No | 27.06 | No |
| | 6 | 15 | 36 | 33 | 32 | 5.48 | Yes | 27.06 | Yes | 4.7 | Yes | 27.06 | Yes | 4.44 | Yes | 27.06 | Yes |
| MAAS | | | | | | | | | | | | | | | | | |
| | 1 | 3.6 | 3.9 | 4.4 | NA | 0.8 | No | 4.26 | No | 2.12 | Yes | 4.26 | Yes | NA | NA | NA | NA |
| | 2 | 3.9 | 3.9 | 4.0 | 4.7 | 0 | No | 4.26 | No | 0.27 | No | 4.26 | No | 2.12 | Yes | 4.26 | Yes |
| | 3 | 3.1 | 3.4 | 3.1 | 3.5 | 0.8 | No | 4.26 | No | 0 | No | 4.26 | No | 1.06 | No | 4.26 | No |

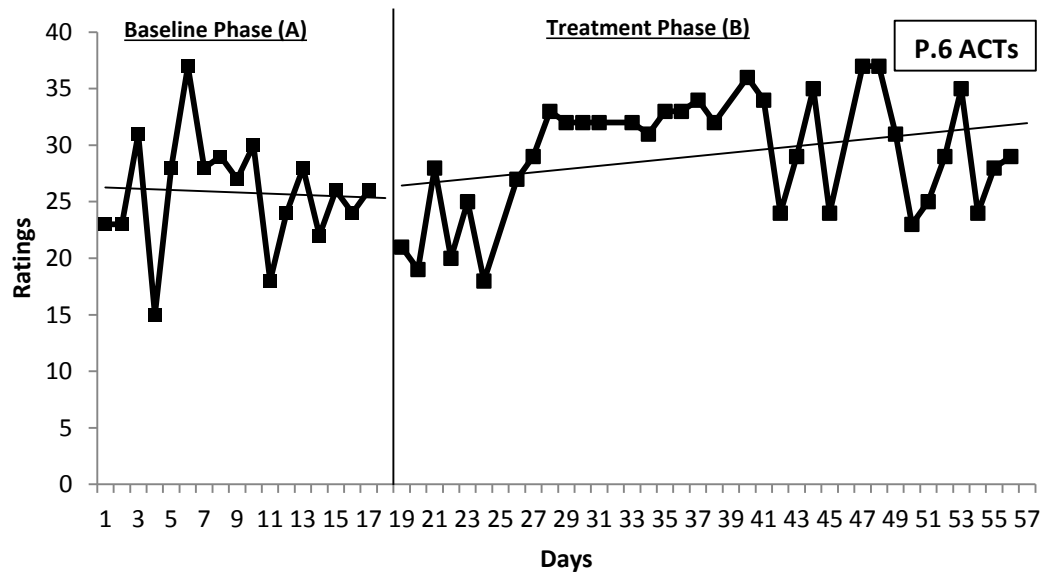
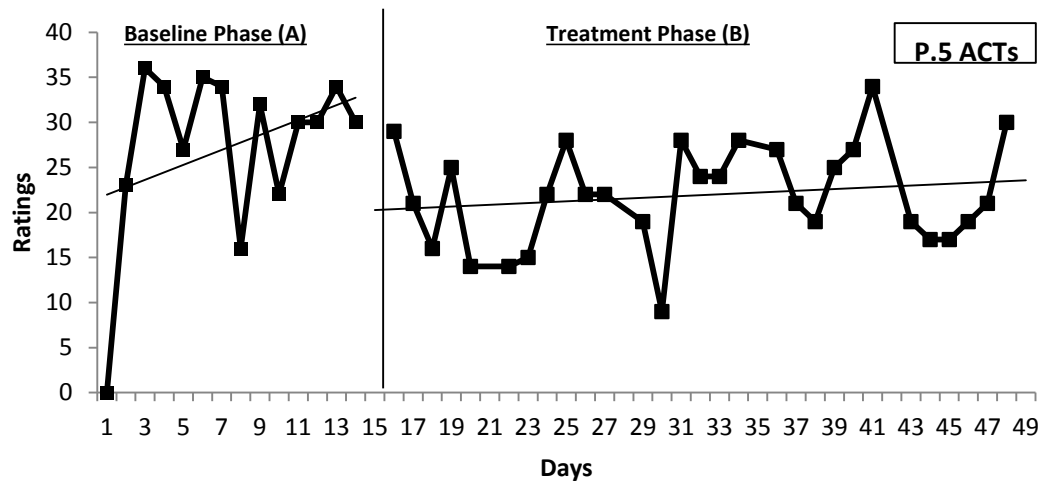
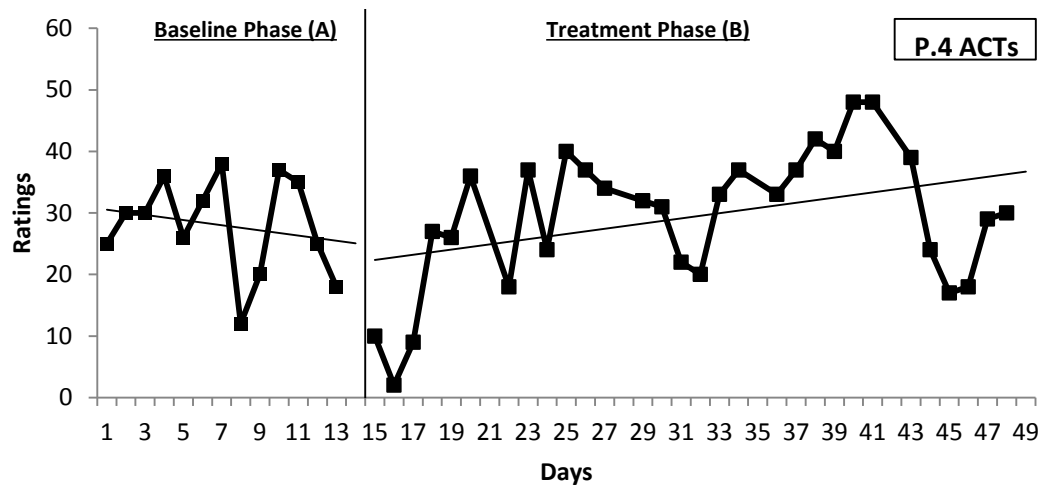
Table 26. *Continued**Raw data relating to RCI and CSC*

| Measure | P. | Pre | Mid | Post | FU | RCI (Pre- mid) | RCI (Pre- mid) | CSC (Pre- mid) | CSC (Pre - mid) | RCI (Pre- post) | RCI (Pre- post) | CSC (Pre- post) | CSC (Pre- post) | RCI (Pre- FU) | RCI (Pre- FU) | CSC (Pre- FU) | CSC (Pre- FU) |
|---------|----|-----|-----|------|-----|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|
| | 4 | 2.5 | 3.7 | 4.1 | 3.9 | 3.18 | Yes | 4.26 | No | 4.24 | Yes | 4.26 | No | 3.71 | Yes | 4.26 | No |
| | 5 | 2.0 | 2.5 | 2.7 | 2.6 | 1.33 | No | 4.26 | No | 1.86 | No | 4.26 | No | 1.59 | No | 4.26 | No |
| | 6 | 2.5 | 3.8 | 4.5 | 4.5 | 3.45 | Yes | 4.26 | No | 5.3 | Yes | 4.26 | Yes | 5.3 | Yes | 4.26 | Yes |
| ELS | | | | | | | | | | | | | | | | | |
| | 1 | 33 | 30 | 32 | NA | -0.72 | No | 56.41 | No | -0.24 | No | 56.41 | No | NA | NA | 56.41 | NA |
| | 2 | 51 | 53 | 57 | 48 | 0.48 | No | 56.41 | No | 1.44 | No | 56.41 | No | -0.72 | No | 56.41 | No |
| | 3 | 48 | 54 | 33 | 63 | 1.44 | No | 56.41 | No | -3.6 | Yes | 56.41 | No | 3.6 | Yes | 56.41 | Yes |
| | 4 | 50 | 58 | 64 | 64 | 1.92 | No | 56.41 | No | 3.36 | Yes | 56.41 | Yes | 3.36 | Yes | 56.41 | Yes |
| | 5 | 66 | 63 | 64 | 79 | -0.72 | No | 56.41 | No | -0.48 | No | 56.41 | No | 3.12 | Yes | 56.41 | Yes |
| | 6 | 55 | 62 | 70 | 67 | 1.68 | No | 56.41 | No | 3.6 | Yes | 56.41 | Yes | 2.88 | Yes | 56.41 | Yes |
| EE neg. | | | | | | | | | | | | | | | | | |
| | 1 | 4 | 4 | 2.7 | NA | 0 | No | 2.05 | No | 4.87 | Yes | 2.05 | No | NA | NA | NA | NA |
| | 2 | 3.3 | 4 | 3.7 | 4 | -2.62 | Yes | 2.05 | No | -1.5 | No | 2.05 | No | -2.62 | Yes | 2.05 | No |
| | 3 | 4 | 2.3 | 4 | 2.3 | 6.37 | Yes | 2.05 | No | 0 | No | 2.05 | No | 6.37 | Yes | 2.05 | No |
| | 4 | 3.7 | 2.7 | 1.0 | 1.3 | 3.75 | Yes | 2.05 | No | 10.1 | Yes | 2.05 | Yes | 9.0 | Yes | 2.05 | Yes |
| | 5 | 3 | 4 | 4 | 3.7 | -3.75 | Yes | 2.05 | No | -3.75 | Yes | 2.05 | No | -2.62 | Yes | 2.05 | No |
| | 6 | 2.3 | 1.7 | 2.0 | 1.7 | 2.25 | Yes | 2.05 | Yes | 1.12 | No | 2.05 | No | 2.25 | Yes | 2.05 | Yes |

Note: FU; Follow-up; NA: Not Applicable

6.13 Appendix M: Daily ACT Graphs for Each Participant





Thesis Project Poster

Introduction

- Obesity is a growing global epidemic¹ and it is associated with significant health consequences². However, weight loss and its maintenance over time is difficult, leading to experts recognising the psychological challenges of obesity³.
- Obesity has been linked with emotional eating⁴. Consequently, interventions that tackle this way of eating may be an effective means of addressing obesity⁵.
- Acceptance and Commitment Therapy (ACT) is a psychotherapeutic approach which may help reduce emotional eating. Acceptance-based approaches have been found to be useful with improving coping with food cravings⁶, increasing physical activity⁷, leading to weight loss, especially in those who struggle with emotional eating^{8,9}. Therefore, ACT has the potential to provide individuals with the psychological tools necessary to achieve weight loss goals.

Research Aims

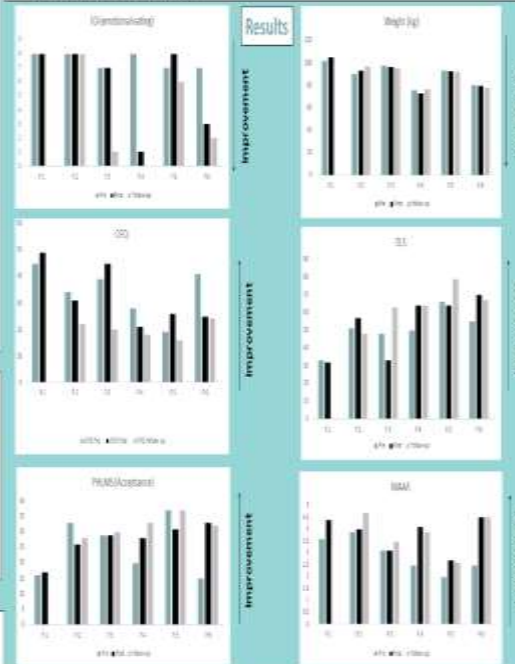
- To evaluate the efficacy of an ACT guided self-help intervention for emotional over-eaters.
- To examine whether the ACT intervention affects self-report and behavioural outcomes.

Method

- A single-case design with six emotional eaters with a BMI >25.
- Guided self-help ACT intervention over a five week period.
- Mechanisms of change explored via ACT process measures and emotional eating questionnaires.
- Behavioural outcome of BMI.
- Reliable Change Index (RCI) and Clinically Significant Change (CSC) were calculated¹⁰ on the self-report measures.

Measures

- Internal Disinhibition subscale of Eating Inventory (ID; emotional eating)¹¹; Engaged Living Scale (ELS; values)¹²; Philadelphia Mindfulness Scale (PHMS; acceptance)¹³; Cognitive Fusion Questionnaire (CFQ; fusion)¹⁴, and the Mindful Attention Awareness Scale (MAAS; being present)¹⁵ were administered.



| Participant | Process | | | | Outcome | |
|-------------|---------|------------|-------------|--------|-----------------------------|-----------------------------|
| | Fusion | Acceptance | Mindfulness | Values | Emotional eating (negative) | Emotional eating (positive) |
| 1 | | | ↑* | | ↑ | |
| 2 | ↑* | | ↑* | | ↓ | |
| 3 | ↑* | | | ↑* | ↑ | ↓ |
| 4 | ↑* | ↑* | ↑ | ↑* | ↑* | ↑ |
| 5 | | | ↑* | ↑* | ↓ | ↓ |
| 6 | ↑* | ↑* | ↑* | ↑* | ↑* | ↑ |

Note: Reported results based on follow-up scores. * indicates directionality of Reliable Change. ↑ indicates deterioration away from the desired direction of change; ↓ indicates improvement in the direction of desired change; ↑ indicates those who have "recovered" as they achieved both RCI and CSC.

Discussion

- At follow-up, half of the sample no longer met the clinical cut-off as "emotional eaters".
- Two participants "recovered" on an emotional eating measure in response to negative emotions, whilst all participants "recovered" on at least one ACT process.
- Changes in weight varied, with three participants losing weight and three participants gaining weight.
- There was evidence of mediation; changes in all ACT processes occurred prior to, or alongside, changes in emotional eating for two participants.
- Qualitative feedback indicated that all participants found the intervention helpful.
- Potential confounding variables include procedural aspects and non-specific effects¹².
- These findings, although mixed, contribute to the ACT evidence-base.
- Further evaluation of this approach is required.

Clinical Implications

- The intervention was well tolerated by participants.
- All participants engaged in the intervention and remained enrolled until completion.
- The low-intensity nature of the intervention and lack of attrition have promising cost-saving implications for clinical services.

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